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The Effects of Exposure to Images of the Male Muscular Ideal on Body Image and Muscularity Concerns in Men

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THE EFFECTS OF EXPOSURE TO IMAGES OF THE MALE MUSCULAR IDEAL ON BODY IMAGE AND MUSCULARITY CONCERNS IN MEN

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Chairperson

This dissertation meets the standards for appearance, conforms to the style and format requirements of the Graduate School of the University of North Dakota, and is hereby approved.

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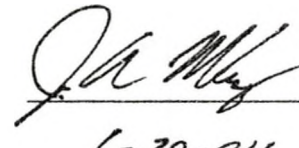
Signature 

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ABSTRACT

Though body-image has been well-researched in women for more than 40 years, theoretical discussions and empirical investigations addressing male body-image have only recently began to emerge. Work by Pope, Phillips and Olivardia (2000) has begun to identify the dynamics of male body-image distortions and the role media depictions of muscular men may play in their pathogenesis. The empirical literature is curiously devoid of experimental investigations of male responses to media and advertising depictions of muscular men.

The present study was designed to parallel the well-established literature examining women's responses to fashion images in terms of changes in body-image and mood state post-exposure (Groesz, Levine & Murnen, 2002). The present study employed images of competitive bodybuilders and average men shown to men who worked out regularly (n=33) and men who did not (n=32). Measures of mood state (Profile of Mood States; McNair, Lorr & Droppleman, 1971), body-image (Body Shape Questionnaire; Cooper, Taylor, Cooper & Fairburn, 1987) and muscularity concerns (Swansea Muscularity Attitudes Questionnaire; Edwards & Launder, 2000) were taken pre and post-exposure to determine what changes may result from exposure.

Men responded to images of bodybuilders with increased drive for muscularity, increased attribution of positive characteristics to muscular men, decreased vigor, increased fatigue and increased depression. These effects were particularly strong in the men who worked out on a regular basis. These findings are discussed in the context of

theoretical work in the area of male body-image disturbance as well as the empirical literature for women's exposure to images of the media ideal. Future directions for research are recommended in light of present findings and limitations.

CHAPTER I

INTRODUCTION

Hilde Bruch (1962) first identified dysfunctional and distorted body-image as an integral characteristic of anorexia nervosa and more generally disordered eating in general. More recently, the American Psychiatric Association (1994) has described distorted body-image in the context of anorexia nervosa as "disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation." (p. 550). Body-image disturbance has also been linked to bulimia nervosa, and even warrants diagnosis of body dysmorphic disorder if the disturbance is sufficiently serious (APA, 1994). Disturbed body-image causes both acute and chronic distress even in those who do not develop full-blown eating disorders (NEDA, 2004). This alone would warrant serious clinical and laboratory investigation; however, distorted body-image may lead to the development of body dysmorphic disorder or to one of the eating disorders. These conditions may cause serious relationship difficulties or impairment, but the eating disorders particularly carry the risk of potentially lethal health complications (NEDA, 2004). Body-image disturbance plays a necessary, but not sufficient role in the development of eating disorders as not all women with disturbed body image develop an eating disorder. Female body-image distortion has been the focus of psychological inquiry for more than 40 years; however, the phenomena has been largely neglected and dismissed in men. Recent work by Pope, Phillips and Olivardia (2000) and a handful of others has finally brought male body-

image distortions into the public eye. New lines of research have begun to raise professional and public awareness of this group of serious conditions effecting male body-image and health.

Body Image Research in Women

Though little theory and research have been generated directly addressing body-image in males, much can be learned by first examining the literature regarding women to create a context for the work addressing men. Research on body-image disturbance has conventionally examined two kinds of distortion: perceptual disturbances and emotional or attitudinal distortions. A variety of theories proposed to explain the etiology of anorexia nervosa have hypothesized perceptual or biological defects that cause the anorexic individual to systematically overestimate the size and/or shape of his or her own body while perceiving others fairly accurately. Recent empirical investigations have failed to support any perceptual dysfunction that can account for differences between eating disordered participants and non-disordered controls. Szymanksi and Semie (1997) conducted an innovative study using a video camera modified to distort images of the participant as well as pre-recorded images of a model. The participant was asked to compare an undistorted image of her own body with images modified to make her appear –16%, -12%, -8% -4%, actual size, +4%, +8%, +12% and +16% her actual size. Each woman was asked whether two images (one her actual size, and either her actual size or one the levels of distortion already described) differed for 180 trials. This process was then repeated using a model. Eating disorder participants and controls performed equally well when detecting increases or decreases in the model's body as well as when detecting decreases in her own body; however, eating disordered participants were less able to

detect increases in her own body. The results of this study strongly militate against the perceptual model, as the model would predict eating disordered participants to be more sensitive to increases in size and less sensitive to decreases than controls. Meta-analytic reviews have offered additional evidence against the perceptual hypothesis of body-image disturbance.

Cash and Deagle (1997) conducted a meta-analysis of 66 studies examining body-image disturbances in anorexia nervosa and bulimia nervosa. Studies using attitudinal measures of disturbance, such as the Body Shape Questionnaire and other inventory measures, produced effect-sizes roughly twice as large on body-image as perceptually based measures (1.13 vs. .61). Measures of body dissatisfaction were able to distinguish between anorexia and bulimia (participants with bulimia were more dissatisfied with their bodies), whereas perceptual measures were not. On average, eating disordered participants perceptually distorted body size about 73% more than controls, but attitudinal dissatisfaction and disturbance exceeded 87% of controls. The authors concurred with many noted theorists and researchers in this area (Brinded, Bushnell, McKenzie & Wells, 1990; Hsu & Sobkiewicz, 1991; Lautenbacher, Roscher, Strian, Pirke & Krieg, 1993) when noting that while there is a consistent trend to overestimate body size in eating disorder women the relationship is weak, unstable or not particularly pathological. The authors went on to state that eating disordered women give accurate estimates of inanimate or neutral objects and that signal-detection paradigms have also failed to support a general perceptual deficit (Gardner & Moncrieff, 1988; Szymanski & Seime, 1995). Effect sizes were largest for both attitude and perceptual based measures when overall body shape was examined with differences diminishing substantially when

specific body parts were queried individually. The consensus in the research literature is that people suffering from body-image disturbance tend to overestimate body-size, but that the mechanism is not primarily sensory. Cognitive, affective and attitudinal factors all contribute to the construct of body-image, and to its disturbance or distortion.

The research literature has described ample influences on the development of distorted body-image. Post-modern and feminist theorists have generated much of the theory pertaining to body-image disturbance in the context of social constructionism. Social constructionism holds that an objective reality knowable through a positivistic approach is misguided. Our world can only be understood in the context of subjective understandings of reality that society mutually agrees upon. The most basic example of these socially constructed meanings is language. The word "cat" only has meaning because the society of English speaking peoples have agreed that it refers to a small four-legged feline animal. These meanings are described as socially constructed because they are mutually agreed upon rather than inherent consequences of reality; put more eloquently "A rose by any other name would smell as sweet". In short, a word is just a word with no essential relationship to the thing or concept it describes. The words we use to describe concepts, and conversely those concepts referred to by words are creations of our society. This is as true for concepts such as virtue, honesty and respect as it is for more basic notions such as a cat. Further, not all civilizations agree to the same meanings for similar concepts. A more notorious, and especially germane, example is the concept of beauty and more specifically the ideal of beauty. Throughout the ages the western ideal of beauty has varied wildly. Empirical studies (Garner, Garfinkle, Schwartz & Thompson, 1980; Wiseman, Gray, Masimann & Ahrens, 1992) have

documented a trend towards the media depicting women as increasingly thin over the past 30 years. Ironically, during the same time period the average woman actually increased slightly in size. Numbers aside, one needs only to compare the paintings of Paul Ruben to an issue of *Cosmopolitan* to see the striking differences in desirability which do not begin to address the variability across contemporary societies at any given time.

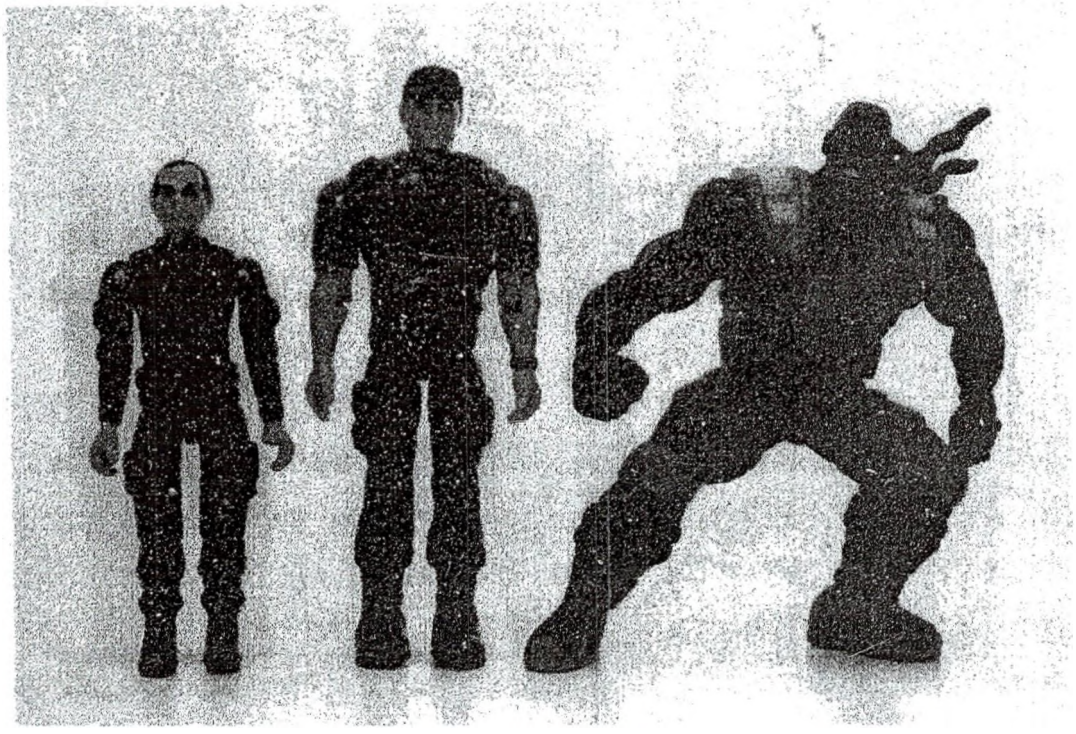
Clearly the concepts or social constructions must be passed down from one generation to the next in a manner similar to other cultural concepts. Peers, parents and the media are three socio-cultural agents that enculturate young people with the social constructions that pervade any given culture. Dunkley, Wertheim and Paxton (2001) performed path analyses based on nearly 580 Australian high school women that revealed links between all three influences (peers, parents and the media) and both drive for thinness and body dissatisfaction. Media contributed most strongly to drive to be thin and peer influences contributed most powerfully to body dissatisfaction. Parenting influences represented a "reality check" of sorts primarily providing feedback when a young woman was indeed above or below average weight. It is important to note that this project was conducted on a general sample of female high school students, not a sample of eating disordered women. Research by Lieberman (1995) as well as Stiegel-Moore & Kearny-Cooke (1994) found that family and parental influences were very demanding with an emphasis on issues of weight and appearance in the households of origin for women diagnosed with eating disorders. Haworth-Hoeppner (2000) performed a qualitative analysis of interviews with 32 white middle-classed women revealing that a critical, unemotional parent-child relationship discriminated women with eating disorders

from those without one. Although the influence of parents can certainly be a salient contributor to the development of an eating disorder or body image disturbance, Mazur (1986) and Heinberg (1996) have argued that mass media is the most overwhelming source of information about cultural ideals. Levine, Smolak and Hayden (1994) found that 70% of young women who read magazines on a regular basis endorse them as an important source of information on health, beauty and fitness. Stormer and Thompson (1995,1998) have described a multitude of methods that are used to manipulate images that appear in those magazines. These techniques include airbrushing, soft-focus cameras, using computer editing to splice together different body parts from separate women to make a composite image and using computer wire-frames with image mapping to manipulate the dimensions of a photograph. Nichter and Nichter (1991) found that a sample of adolescent girls described the "ideal teenaged girl" as 5'7", 100 pounds and a size 5. This ideal girl would have a body mass index of less than 16 placing her in the clearly anorexic or amneorrheic range. Garner et al. (1980) and Wiseman et al. (1992) showed that media articles are increasingly encouraging young women to "watch their diets". More dishearteningly, a study by Taylor et al. (1998) reported that peer and media influences are even important to girls as young as elementary school.

Elementary school girls are exposed to a host of different media influences than their older counterparts, raising the questions of what sources influence these young girls and beginning at what age. A number of feminist critics have suggested that the popular Barbie doll perpetuates an unrealistic image of what women should be to young girls. Sutton-Smith (1986) asserted that Barbie represents an ideal of "useless beauty" and "empty glamour" that is dangerous in the extreme given that Mattel, the maker of Barbie,

considers the doll an "aspirational role model" (Pedersen & Markee, 1991) for young girls. Norton, Olds, Olive and Dank (1996) performed an anthropometric analysis on Barbie and Ken dolls to determine the dimensions a life-sized Barbie would have. This research team averaged measurements taken on five different dolls for each Barbie and Ken to take into account small differences in the manufacture of individual dolls. The mean measurement for each dimension of the five dolls was adjusted to its proportional size for a person 170.18 centimeters tall (the anthropometric standard height). The average z-score for the life-sized Barbie within the distribution of Australian women was –4.2. Scores for individual body parts ranged from -.5 for head to –7 for the waist. The chest to waist ratio for the life-sized doll would have a z-score of 13.1, as determined largely by the unrealistically tiny waist. The mean z-score of –4.2 represents an average body part girth attainable by approximately 1 in 100,000 young women. Individual parts, such as the waist, are all but physiologically impossible to attain for any adult human being. The Ken doll represented a somewhat more attainable ideal with a mean z-score of –2.1 corresponding to approximately 1 in 50 men capable of attaining its dimensions. This does not mean that Mattel has single handedly created the body-image and eating disorder epidemics; they have, however, certainly played a prominent role in socializing young girls as to culture's expectations of a masculine standard and a feminine ideal. In concert, the socio-cultural factors outlined above communicate powerful messages to young women about the standards expected by western societies. Futile attempts to realize this ideal lead to pathological eating and body concept that quickly spirals out of control. Interestingly, women have relatively accurate ideas about the ideal masculine physique (Pope et. al., 2000); however, men who played with GI Joe and He-Man instead

of Barbie have wildly distorted ideas about masculine ideals. Not that boys' action figures have always been unreasonable. In 1964 GI Joe, if extrapolated to a 5 foot 10 inch man, had a 44 inch chest and 32 inch waist with 12 inch biceps, the respectable physique of a reasonably fit man. By contrast, the modern GI Joe figure would have a 55 inch chest, 29 inch waist and 27 inch biceps, larger muscles than many competitive bodybuilders and a smaller waist than most high school boys (see Figure 1). A physique of these dimensions is all but medically impossible without the use of anabolic steroids (Pope et. al., 2000; Pope, Olivardia, Gruber & Borowiecki, 1999). The exact nature of mass media bombardment targeted at men is structurally almost identical to the pressures exerted on women. These media messages will be covered in greater detail later, for now the focus will return to experimental findings relating to the responses invoked by exposure to images of media ideals in women. To date, no similar work has been conducted examining men's responses to media ideals.



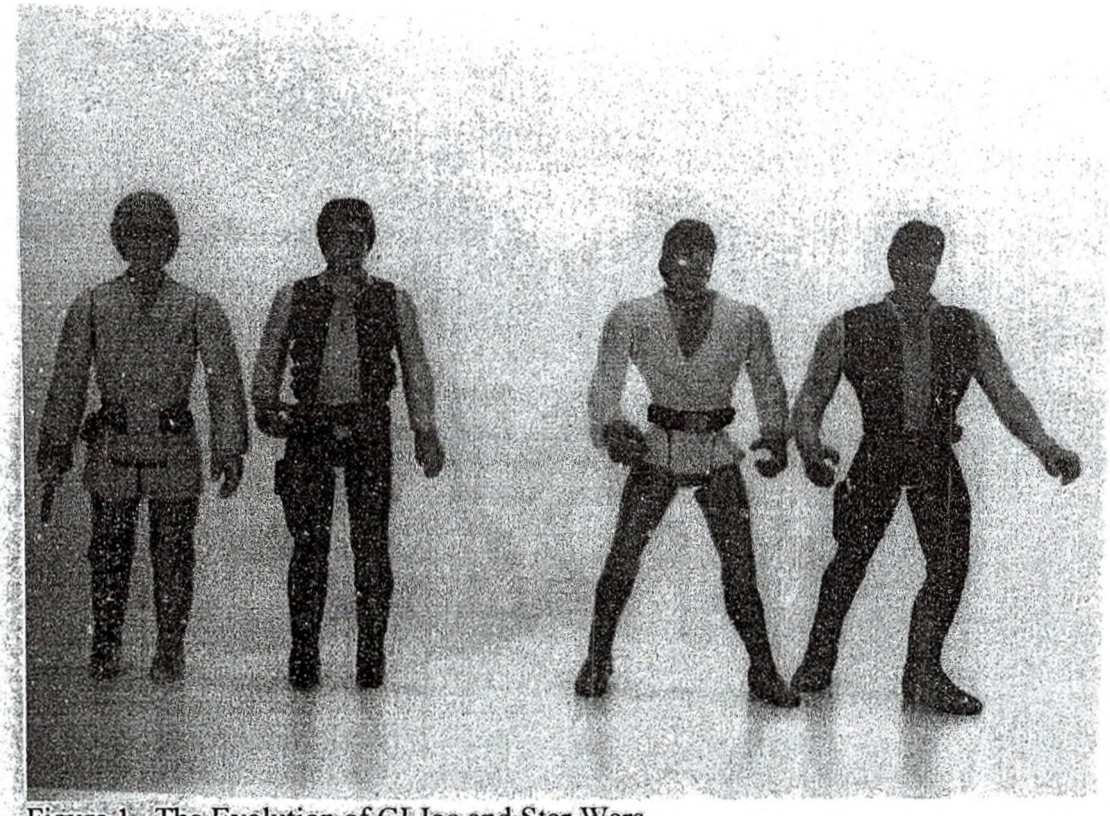


Figure 1. The Evolution of GI Joe and Star Wars.

The Effects of Experimental Exposure to the Thin Media Ideal on Women

Pope et. al. (2000) have proposed that the dynamics of media exposure and emotional arousal in body-image disturbance are very similar for men and women. Before examining Pope's idea's regarding the socio-cultural forces influencing men, which make extensive reference to the literature regarding women, a review of the germane literature for women seems in order. One study examining the effect of exposure to fashion/media ideal images on mood state (Pinhas, Toner, Ali, Garfinkel & Stuckless, 1999) found that both depression and anger increased after exposure to just 20 slides depicting the media ideal for women. The effect was particularly strong in the subset of women who were already at risk for pathological eating patterns. Another study (Stice & Shaw, 1994) found that as little as three minutes of exposure to twelve

fashion images produced increases in guilt, shame, stress, depression and insecurity as opposed to no such increase for a control group shown images of average sized women. These two studies typify a wealth of research articles with strikingly similar findings: even brief exposure to the mass media ideal brings about toxic emotional states and body dissatisfaction in women, particularly those women already dissatisfied with their bodies or experiencing an eating disorder. A recent meta-analysis covering 25 studies, with 43 comparisons (Groesz, Levine & Murnen, 2002) found that exposure to thin media ideal images led to significantly worsened body image than when exposed to average sized models, plus-sized models or inanimate objects. This effect was strongest in women less than 19 years of age and when the women were either identified with significant body issues, or non-specified body issues. When women were screened for body issues, those without serious concerns showed a consistent, but very modest negative response to media ideal images. Lavin and Cash (2001) reported that body-image actually decreased or worsened in women presented with research information regarding body image and media exposure relative to women listening to a control tape about research on television violence. Stormer and Thompson (1998) found that only those women who had high levels of internalization of media ideals (those women who accepted that media images are realistic expectations with which average women can be compared) showed improved body image when educated about the great lengths the media go to in order to artificially create the thin ideal (airbrushing, computer editing and even computer generated images). Education did not show any benefits for women with less than the highest levels of internalization for depictions of the media ideal.

The Role and Influence of Obligatory Exercise

Within the eating disorder and body-image disturbance literature long-distance runners and obligatory exercisers have developed as a popular comparison or reference group. Running in particular and obligatory or compulsive exercise in general is an ideal analogue for eating disorders because both sets of phenomena involve careful monitoring of food intake; despite this, few studies have identified pathology in the runners and exercisers (Blumenthal, O'Toole & Chang, 1984; Weight & Noakes, 1987; Nudelman, Rosen & Leitenberg, 1988; Goldfarb & Plante, 1984). Compulsive exercisers serve as an ideal bridge between the eating disorder-body image disturbance in women literature and the body-image disturbance in men literature. In general, women with disturbed body-image seek to become thinner by restricting calorie intake and/or increasing energy expenditure. Men with body image distortion often seek to become larger and more muscular, but still lean, by careful control of diet and a regimen of rigorous strength training combined with running or other cardiovascular exercise (Pope et. al., 2000). The dynamics for men and women are remarkably similar with only the end states differing. In some important ways, obligatory exercise represents a mid-point on a continuum embracing the range of potentially pathological kinesthetic responses to body dissatisfaction with anorexia nervosa on one end and hyper-muscular competitive bodybuilders on the other. It seems reasonable to conclude that studies examining "hard-core" exercise, regardless of gender, may inform a discussion of body obsession and body-image disturbance in men.

Though there is limited literature directly addressing men, one recent study (Hausenblas & Fallon, 2002) examined the relationship between body-image, exercise behavior and symptoms of pathological exercise in both men and women. Four-hundred seventy-four university students were measured for body mass index, exercise behavior, body image and social physique anxiety. For females, body mass index was the strongest predictor of body dissatisfaction and social physique anxiety. For men, exercise behavior (frequency and intensity) was the strongest predictor of disturbed body-image and social physique anxiety. Those females who were the thinnest and those men who worked out the hardest and longest were the most satisfied and least anxious. A study conducted by Slay, Hayaki, Napolitano and Brownell (1998) examined motivational factors for running, eating pathology and exercise habits in a sample of obligatory and non-obligatory runners. Obligatory runners showed greater eating pathology and were more motivated by negative factors, such as escape from troubles and dependence, than the non-obligatory counterparts. A study of 181 elite female runners (Hulley & Hill 2001) found that twenty-nine of the women had an eating disorder at the time of the study and six additional women had received treatment for disordered eating in the past. There were no differences in training or racing patterns or behaviors between those with an eating disorder and women without one. Women who suffered from an eating disorder had lower body mass indexes, poorer self-esteem and more pathological scores on the Mental Health Inventory, a general measure of psychopathology. One general finding across many studies investigating obligatory versus non-obligatory exercise is that although obligatory exercisers have somewhat lower body mass indexes than non-obligatory exercisers they have somewhat greater weight concerns than their counterparts

(Slay et. al., 1998; Davis, Fox, Cowles, Hastings & Schwass, 1990; Yates Shisslak, Allender, Crago & Leehey, 1992) and more disturbed body image than non-obligatory exercisers (Davis, Shapiro, Elliot & Dionne, 1993; Imm & Pruit, 1991; Kiernan, Rodin, Brownell, Wilmore & Crandall, 1992). One study (Powers, Schocken & Boyd, 1998) that directly compared female obligatory runners and male obligatory runners to anorexic women on the MMPI II, BDI II and body-image measures found that the obligatory runners, both male and female, scored in the normal range on measures of pathology while anorexic participants showed elevated BDI II scores, systematic spikes on the depression, hysteria and psychopathic deviance scales of the MMPI II and more disturbed body image. The dynamics of obligatory exercise are not yet fully understood, however the available literature seems to suggest that obligatory exercise may occupy some middle ground between people with healthy body image/eating habits and the clearly pathological eating disordered population.

Some Myths and Realities Regarding Femininity, Masculinity and Disordered Eating

It is widely believed that femininity is strongly related to pathological eating and that masculinity is a strong protective factor for eating disorders. More simply, a very feminine woman may likely suffer from an eating disorder, but a masculine man would not likely be afflicted with an eating disorder. Murnen and Smolak (1997) conducted a meta-analysis using 22 studies examining degree of femininity, degree of masculinity and extent of disordered eating. Gender role was quantified using either the Personal Attributes Questionnaire (Spence & Helmreich, 1978) or the Bem Sex Role Inventory (Bem, 1974), and eating pathology was measured as the score on the Eating Attitudes Test (Garner, Garfinkel, Bohr & Garfinkel, 1982) or on the Eating Disorders Inventory.

(Garner, Olmstead & Polivy, 1983) The meta-analysis found that femininity was weakly, though consistently, related to eating pathology (d=.14) and that masculinity was weakly indicative of non-disordered eating patterns (d=-.13). Cohen (1977) suggested .2 as the cutoff for a small effect size, which is a somewhat stronger relationship than was found by Murnen and Smolak's meta-analysis. In this light it seems clear that relationship between gender role and eating pathology is modest at best, leaving far more variance accounted for by other factors.

Although gender role appears to play little role in disordered eating, recent research has found that sexual orientation, at least in men, may play a significant role. Homosexual men have consistently been found to exhibit higher levels of body dissatisfaction (Russell & Keel, 2002; Williamson & Hartley, 1998; Garner, 1997; French, Story, Remafedi & Resnick, 1996; Beren, Hayden, Wilfley & Grilo, 1996; Schneider, O'Leary & Jenkins, 1995) and eating pathology (Russell & Keel, 2002; Williamson & Hartley, 1998; French et al., 1996; Siever, 1994) than heterosexual men. In general, research has found homosexual men at roughly twice the risk for eating disorders as heterosexual men. For body-image disturbance the numbers are much more similar. Studies have repeatedly found statistically significant differences, but the size of the differences is small. For example, Garner (1997) found that 57% of heterosexual men were either "extremely" or "somewhat" satisfied with their bodies, whereas 44% of homosexual men were equally satisfied. A study conducted in the United Kingdom extended the findings of Murnon and Smolak's (1997) meta-analysis to the homosexual population. Meyer, Blissett and Oldfield (2001) found that feminine gender role, regardless of sex, was a modest risk factor for eating pathology and that masculine

gender role, again regardless of sex, was a modest protective factor against disordered eating.

In recent years theories that address sex differences have become somewhat more sophisticated. Gill (1998) noted a trend within the field to describe sex differences as largely overlapping distributions with relatively modest mean differences. She highlighted that even variables traditionally viewed as predominantly determined biologically such as sports performance reveal only meager differences when examined empirically. For example, the modal center of a men's college basketball team is somewhat taller than the modal center of a women's college basketball team, but she is still taller than the average man. The same can be said for sprinters, weight lifters or people involved with any number of other endeavors typically thought to represent large sex differences. Gill asserted that biological sex accounts for a small amount of variance in most phenomena, but that it interacts with a number of other factors to influence thoughts, feelings and behaviors. Pope et. al. (2000) agree with Gill's analysis suggesting that in actuality the rates of body-image disturbance and eating pathology are much closer between the sexes than the typically cited 10:1 (APA, 1994) rate of females to males. They discussed a variety of factors that may serve to disguise the actual rates of disturbance in men which will be covered in greater detail shortly.

A final misconception regarding men, women and the pressures of society deals with actual ideals and the media ideals for body size. Psychology, and the public to some extent, recognize that the standards the media put forth for women are unrealistic. Perhaps many would even acknowledge that media images of men are somewhat unrealistic, however it is widely held that society holds women to higher standards

relative to that ideal than men (Rand & Kuldau, 1990; Rodin, Silberstein & Striegel-Moore, 1985). A recent investigation by Rand and Wright (2001) examined the ideal body size for males and females as rated by 303 children, 427 adolescents, 261 young adults and 326 middle-aged adults. Possibilities were presented as sketches ranging from extremely thin to obviously obese and were made for babies, children, young adults, middle-aged adults and older adults. For all rating periods and all groups the majority of participants chose the same ideal size for women as they did for men. The one exception was when young adults rated pictures of young adults. In this condition there was a consistent bias toward a thinner female. Across all conditions it was very rare for ratings to differ by more than a single size (out of nine possible), though when ratings did differ the woman was rated as the thinner ideal by a ratio of 9:1. Across all groups there was a small bias towards favoring a thinner female, however the difference was much smaller than the discourse in the field would have suggested. This finding can be taken as either encouraging or harrowing. It may address the disparate media ideals as artificial relative to the perspective of society as a whole; conversely it could reveal that both women and men are held to unreasonable standards.

Male Body-Image Disturbance

Recent work has began to examine the nature of body-image disturbance and the prevalence of disordered eating in men. Olivardia, Pope, Mangweth and Hudson (1995) reported that the level of body-image distortion in men with eating disorders is quite similar to the level in women with similarly pathological eating patterns. Phillips (1997) documented the occurrence of body dysmorphic disorder in men and a more specific sub-type called muscle dysmorphia (Pope, Gruber, Choi, Olivardia & Phillips, 1997). Muscle

dysmorphia, an obsessional preoccupation with muscularity, involves a pathological fear of appearing too small or not muscular enough. Often men suffering from muscle dysmorphia have significantly impaired social functioning, refuse to go out in public save for trips to and from the gym and abandon important social contacts or functions in order to spend more time in the gym. Even the investment of countless hours in the gym fails to realize the unrealistic goals these men have set for muscularity. Bewildered, many men have turned to dangerous and illegal anabolic steroids in an attempt to assuage the anxiety caused by feeling too small (Pope et al., 2000; Pope & Katz, 1994). Provided that a man ingests sufficient protein and calories while working out both vigorously and regularly he will experience tremendous increases in muscle mass far exceeding the natural limits of his body. Abuse of anabolic steroids comes with serious side effects including increased aggressiveness, violence, increased risk of prostate and liver cancer, elevated levels of blood cholesterol, increased incidence of heart disease and unusually early incidence of stroke (DEA, 2002). Large scale studies (Buckley, 1988; DuRant, Rickert, Ashworth & Newman, 1993) have found consistent rates of approximately 6.5% for high school boys who have illegally tried anabolic steroids. Combining rates from high school studies with conservative estimates of abuse in older cohorts yields a cautious estimate of 2 to 3 million American men who have abused anabolic steroids at some point in their lives (Pope et al., 2000). Unfortunately the most serious side-effects do not typically manifest until many years after exposure to steroids. For many men, the possibility of serious medical complications thirty to forty years from now simply can not compete with realization of substantial gains in muscle mass right now.

Pope et al. (2000) argued that society imposes unrealistic standards on men in a remarkably similar manner to the forces already described as impacting women. Societal forces ranging from childhood action figures to magazine advertising to Hollywood's blockbuster movies both implicitly, and occasionally explicitly, convey the message that a "real man" has bulging muscles, does not fret about his appearance and never, ever discusses any dissatisfaction with his body. From the time of childhood men are bombarded with impossible standards they can never hope to live up to beginning with the action figures pushed by popular toy companies. Pope et al. (1999) documented the trend away from the ordinary everyman physique of action figures from days gone by toward a bodybuilder physique that is impossible to attain without abusing dangerous, illegal anabolic steroids. Pope et al. (2000) reported that advertisements in popular women's magazines depicting scantily clad muscular men have skyrocketed since the early 1980's. A carefully controlled study examined a full year's worth of magazines at five-year intervals for both *Cosmopolitan* and *Glamour* beginning in the late 1950's and continuing until the late 1990's. The number of women depicted in "risqué" dress, defined as inappropriate for walking down a public street, has remained relatively stable since the 1960's. Men were infrequently depicted in such a manner until the early 1980's when "risqué" advertisements began to increase at an exponential rate. Currently, men are depicted undressed slightly more frequently than women in both *Cosmopolitan* and *Glamour*. In male parallels to the classic *Playboy* study (Garner et. al., 1980; Wiseman et. al., 1992) showing that female centerfolds have been becoming successively thinner with time, research (Leit, Pope & Gray, 2001; Spitzer, Henderson & Zivian, 1999) has shown that male centerfolds in the magazine *Playgirl* have become progressively more

muscular and leaner since its inception. Admittedly, not many men read *Playgirl,* but it does represent one index of the standard against which men are measured.

Professional Bodybuilders: The Impossible Standard

Perhaps the strictest standards held out for the average man to aspire towards are competitive bodybuilders. Today the pinnacle of professional bodybuilding is the Mr. Olympia title, formerly it was Mr. Universe and before that the Mr. America title. Prior to the mid to late 1950's anabolic steroids were all but unknown in the world of competitive bodybuilding. The first known incidence of athletes having used steroids to enhance performance was the 1954 Russian weightlifting team, but the rest of the world was all too quick to follow. Pope et al. (2000) suggested that the widespread availability of anabolic steroids on the black market currently fuels the most hard-core men who are willing to trade long term health complications for immediate muscle gains. The authors compared anabolic steroids to a hypothetical drug for women that would cause rapid weight loss, allowing women to change the fundamental dimensions of their bodies largely without short-term health risks. Further, this drug, though illegal, would not show up on routine drug screenings leaving virtually no chance of being caught. How many women would use this fictitious drug which offers a relatively easy way to dramatically alter oneself to more closely resemble the cultural ideal? The authors state that is exactly what steroids can do for men wishing to pursue the muscular ideal set forth by society. The conservative estimate suggests between 2 and 3 million American men have opted to abuse this drug.

The body-mass index is typically used as an index of fitness that has been particularly useful in the eating disorder and body-image distortion literature for women. Body-mass index (BMI) is a person's weight in kilograms divided by height in meters, but it makes no distinction between mass due to fat and mass due to muscle. For this reason, BMI has been found unreliable as an index of fitness in people with a high degree of muscle mass. Kouri, Pope, Katz and Oliva (1995) developed the fat-free mass index (FFMI) as an alternative to BMI that remains a valid index of fitness in people who are very muscular. FFMI is calculated as follows:

(Equation) FFMI = (Lean Body Mass in Kg./Height in M^2) + 6.1 x (1.8 – Height in M)

For some basic anchor points, an FFMI of 16-17 would represent a man most would people would recognize as "flabby" or "frail", approximately 19-20 would typify the average American student and an FFMI of 22-23 would be a man noticeably more muscular than average. Pope et. al. (2000) argued that research into unequivocally steroid-free bodybuilders suggests that the limit a genetically gifted bodybuilder can attain without using steroids while remaining reasonably lean is an FFMI of 26. The average man can never hope to become so muscular without the use of steroids. Adding a considerable degree of fat increases the FFMI the body can maintain without the use of steroids; however, most men would find the necessary level of fat entirely unacceptable. Men who abuse anabolic steroids routinely have FFMI's into the 30's while staying reasonably trim. Bear in mind, the difference between an average man and a naturally gifted bodybuilder in peak condition is about 6 points: bodybuilders who abuse steroids routinely have FFMI's more than 6 points greater than the gifted bodybuilder in peak condition.

Steve Reeves (see figure 2) has generally been recognized as the greatest bodybuilder of the pre-steroid era (Pope et. al., 2000) and was the winner of Mr. America in 1947, then Mr. Universe in 1950. In his prime Mr. Reeves had an FFMI of just over 26 representing perhaps the finest physique toward which any naturally gifted man could ever aspire toward. Training methods and nutrition have come a long way since the days when Mr. Reeves competed, but sound research suggests that a steroid free bodybuilder today would be hard-pressed to match his physique (Pope et. al., 2000). Today's championship bodybuilders (see figure 3) dwarf Mr. Reeves to an extent that science implies would be virtually impossible without abuse of anabolic steroids. The physique of the modern competitive bodybuilder is all but medically impossible without the use of anabolic steroids. These images, the standard toward which many fitness-conscience men aspire, are flagrant violations of nature's limits.

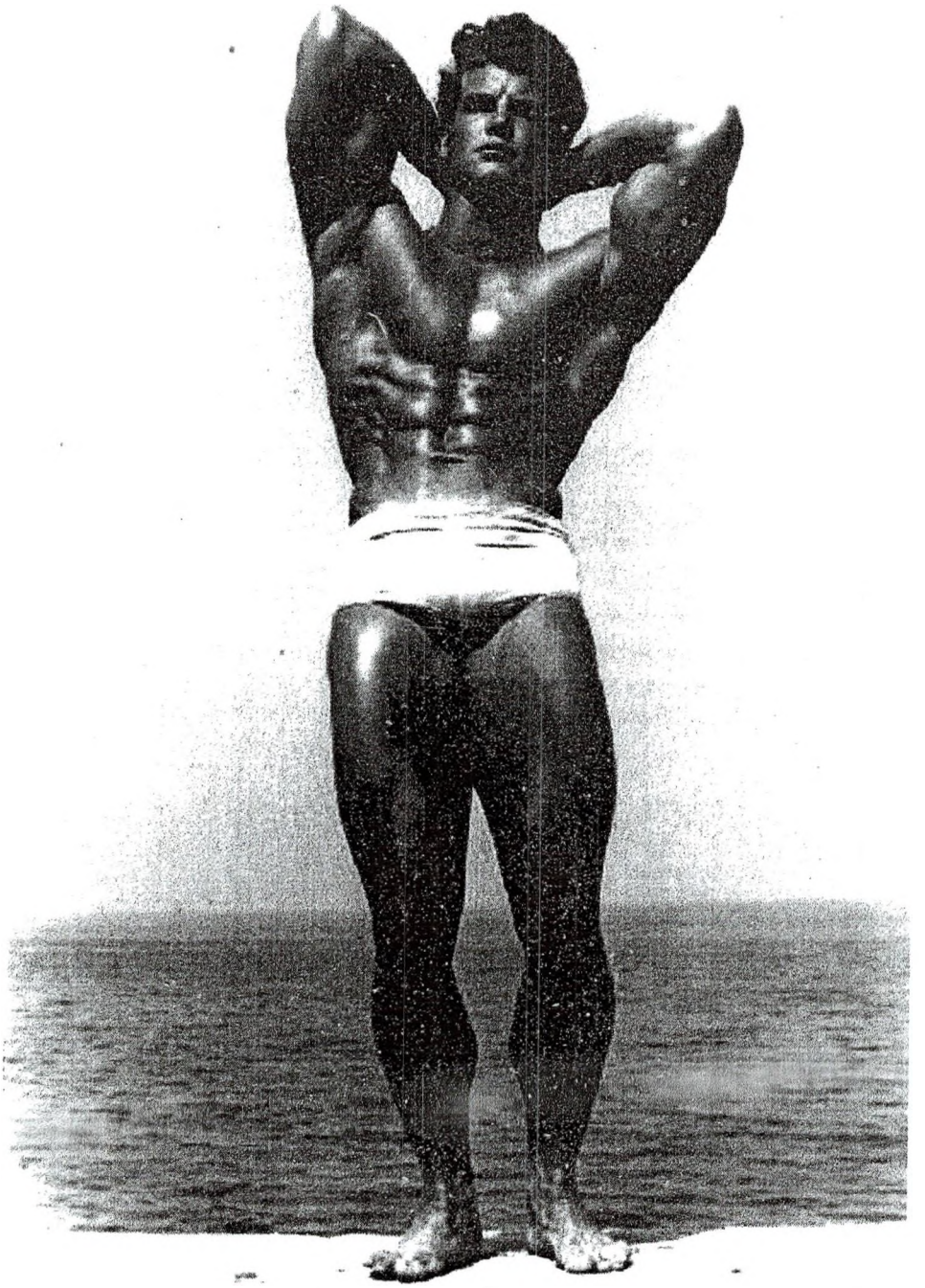


Figure 2. Steve Reeves FFMI=26

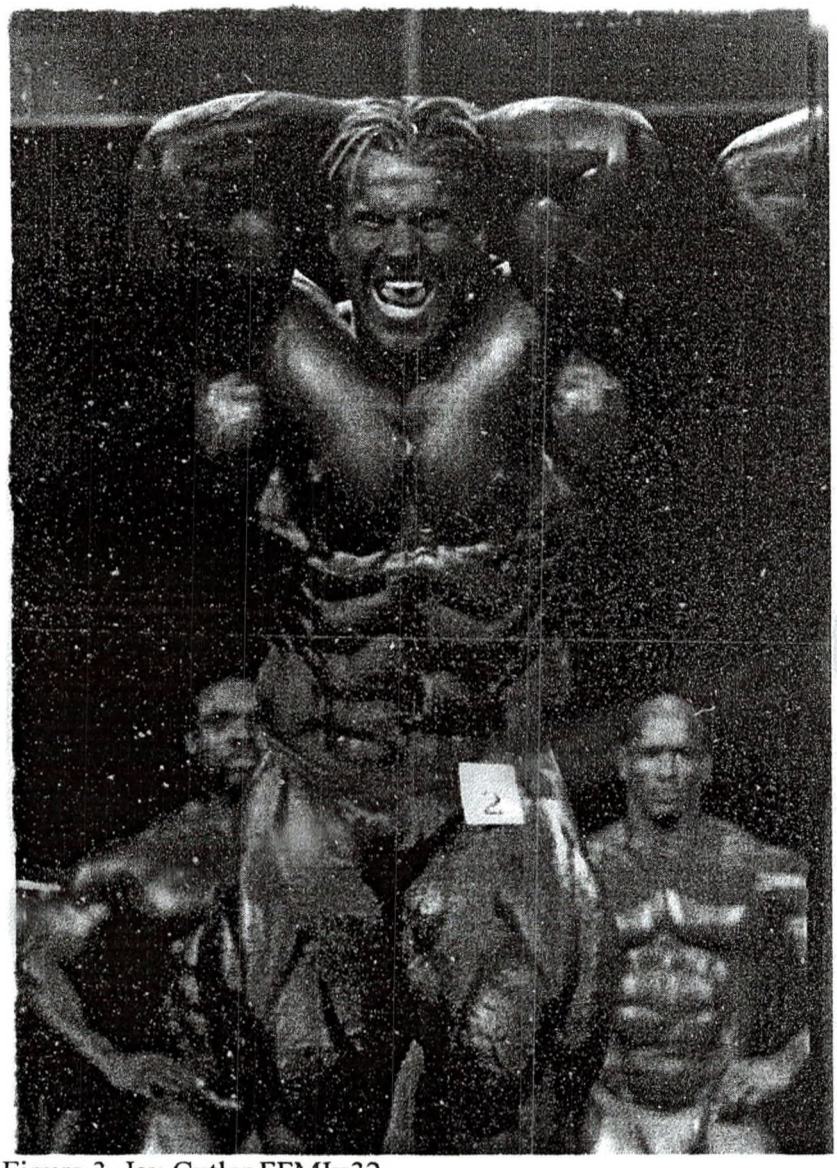


Figure 3. Jay Cutler FFMI=32

Images like the steroid fueled bodybuilder have led American men to desire a body, on average, with 28 pounds more muscle than they actually possess and to believe women want a man with 30 pounds more muscle (Pope et. al., 2000). Studies examining what body type women actually prefer have found that men overestimate the amount of muscle women prefer by approximately 20 pounds (Tantleff-Dunn & Thompson, 1995; Jacobi & Cash, 1994; Fallon & Rozin, 1985). The body that women prefer is somewhat

more muscular than the average American man, but by a modest amount. The steroid-induced bodybuilder look that men think women prefer, was rated as "extremely repulsive" by 94% of women who responded to one street corner survey (Klein, 1990).

Responses to "Hyper Male" Images

There is little theory and almost no empirical studies detailing the responses of men to the images often referred to as "Hyper Males". Pope et. al. (2000) detailed the most credible theory to date in their landmark work The Adonis Complex. The authors suggested that in response to the gains women have made in nearly every facet of society over the past fifty years men have found ever progressively fewer means to assert their masculinity. It is not suggested that the women's movement has "caused" body-image disturbance in men, rather that one set of pathological tendencies, oppressing women, has been replaced with another, obsessive preoccupation with muscularity and appearances. Some subset of men who do not feel securely masculine become overly-invested in a quest after to achieve the societal image of the ultimate male. For some men, this pursuit comes to dominate every waking thought to the exclusion of anything that may interfere with "bulking up". This obsession is a mirror image of the anorexic woman, only pursuing a muscular, rather than waifish, ideal. Some early researchers came to colloquially call this phenomenon "bigorexia nervosa", although the term Adonis Complex has been suggested by Pope et. al. (2000) as an alternative, umbrella term to subsume male body-image disturbance, muscle dysphoria and variety of other obsessions falling under the general heading of body dysmorphic disorder.

Pope et al. (2000) detailed many case examples of men suffering from extreme muscle dysphoria and body image disturbance even going so far as to give up

professional careers in business and medicine because there was not sufficient time to work out. Some of the men knew intellectually they were more muscular than all but the most serious competitive bodybuilders, but could not escape the feeling of being humiliatingly puny. Clearly the men used as case examples were tormented by their condition, however none of them had ever so much as mentioned it to a male friend, and few disclosed their pain to spouses or girlfriends. The authors observed that these men seemed trapped in a double-bind; they felt tormented by body-image concerns but men are not supposed to worry about such things, and should under no circumstances talk about feelings particularly ones related to inadequacy. This "feeling and talking taboo" adds insult to injury by preventing many men from ever seeking help.

Pope and Katz (1994) reported that 16 of 160 men interviewed at a "serious gym" showed prominent symptoms of what they then called reverse anorexia. This survey was by no means a randomly drawn sample; regardless, the implication is both clear and staggering: serious body-image issues in men are far more common than previously thought. Recent estimates (Pope et. al., 2000) suggest that approximately 100,000 American men suffer from clinically significant levels of muscle dysmorphia. This number goes above and beyond the number of men with body dysphoric disorder for issues other than muscularity or less severe incidents of body-image disturbance which the authors estimate is likely in the millions. A study (Olivardia, Pope & Hudson, 2000) examining men diagnosed with muscle dysmorphic disorder (MDD) and weight lifters without body image disturbance revealed that weightlifters, on average, spent about 40 minutes per day preoccupied with thoughts such as "Am I too small? Am I big enough? or How can I get bigger?". Forty minutes seems like a great deal of time to ruminate for

the *non*-disturbed group, but the group diagnosed with MDD spent an average of 325 minutes per day, that is more than five hours obsessing over questions like those above. The authors noted that more than one man said he spends virtually every waking moment thinking about such worries. The same study found that men diagnosed with muscle dysmorphic disorder are at elevated risk for other psychological disturbances. Twenty-nine percent of the men with MDD had a history of eating disorder, compared with less than .1% in the general male population. Further, 58% of the men with MDD had a history of mood disorder, versus 20% of controls and that roughly 30% of the men with MDD had suffered from an anxiety disorder compared with 3% of controls. MDD and other body-image disturbances in men represent serious psychological conditions worthy of investigation and treatment in their own rights, however the dramatic increase in risk for other clinical syndromes makes recognition of these disorders keenly important.

Not all men with body image disturbance obsess over muscularity, nor do all avid weight-lifters suffer from body image disturbance or muscle dysmorphia. Indeed the little literature available regarding competitive female bodybuilders suggests that women who seriously pursue a muscular ideal closely resemble men who do so on relevant training and psychological variables such as obsessions, fear of fatness and dissatisfaction with level of musculature (Anderson, Brownell, Morgan & Bartlett, 1998; Guthrie & Castelnuovo, 1992). These findings may mitigate against a biological model of etiology for muscle dysmorphia, however the literature does not currently support any firm conclusions. Certainly there are men who suffer from more traditional body-image disturbances and/or standard eating disorders such as anorexia and bulimia nervosa in

addition to the men struggling with the issues described here (Fichter & Dasser, 1987; Pope et. al., 2000).

The men most likely to suffer from traditional body-image disturbance and disordered eating patterns are homosexuals. Both theoretical sources (Epel, Spanakos, Kasl-Godley & Brownell, 1996; Anderson, 1999, 1990) and empirical inquiries (Russell & Keel, 2002; Boroughs & Thompson, 2002; Strong, Williamson, Netemeyer & Geer, 2000; Lakkis, Ricciardelli & Williams, 1999; Williamson & Hartley, 1998; Silberstien, Mishkind, Striegel-Moore & Timko, 1989) have identified homosexual men as far more likely to have suffered an eating disorder or serious body-image disturbance as heterosexual men. Estimates for the magnitude of the sexual orientation disparity range from 2.5 times more likely to have suffered from binge-eating disorder (French, Story, Remafedi & Resnick, 1996) to more than 6 times greater incidence of eating disorders in general (Yager, Kurtzman, Landsverk & Wiesmeier, 1988). One explanation offered to account for these differences argues that relative to the "straight culture", "gay culture" places far greater emphasis on the physical appearance of men. Further, much of "gay culture" demands a thin ideal of men as opposed to the muscular ideal that heterosexual men strive to achieve (Anderson, 1999; Epel et. al., 1996). A second explanation for the disparity asserts that homosexual men, on average, have increased gender role identification relative to their heterosexual counterparts (Murnen & Smolak, 1997). To date the empirical literature can not definitively support or refute either hypothesis.

Present Study

The purpose of the present study is to advance present knowledge of male body-image disturbance as a function of media exposure to images of the muscular,

bodybuilder ideal. The intention of the present study is to extend the literature by detailing emotional responses of men to culturally idealized image. The literature on men is presently far behind the literature addressing women in this area. Further, this study will provide descriptive data regarding magazine readership (type and duration) as well as the nature and frequency of exercise. Data generated by this project will make an important contribution to the literature on issues of body-image disturbance in men no matter the outcome due to the lack of data currently available in this area.

A Priori Hypotheses

Hypothesis I: Men who view the bodybuilder slides will exhibit negative changes in mood state, muscularity concerns and body-image post-exposure.

The literature on women's responses to viewing images of the thin media ideal indicates negative changes in mood state and body-image following exposure (Groesz, et. al., 2002). Pope et. al. (2000) suggest that men may respond to images of hyper-muscular men in a similar manner to women's responses to the media thin ideal. They further argue that men are concerned with being both lean and very muscular, as such, it seems reasonable to expect that men's muscularity concerns may change in response to the images in a manner similar to women's responses in body-image indices.

Hypothesis II: Men who exercise more will show more muscularity concerns than peers.

Pope et. al. (2000) argue that only those men who are most invested in their physique will respond pathologically to images of hyper-muscular men. Frequency of work out behavior is a rudimentary measure of investment in one's physique, as such it seems reasonable to expect that those men who work out the most frequently will also respond the strongest to images of bodybuilders.

Hypothesis III: Men who perform the most exercise will show more serious eating pathology than peers.

Consistent research has shown that obligatory exercisers (cardiovascular exercise) are in better physical condition than non-obligatory exercisers but have greater weight concerns than their counterparts (Slay et. al., 1998; Davis, Fox, Cowles, Hastings & Schwass, 1990; Yates Shisslak, Allender, Crago & Leehey, 1992). This hypothesis is based on the assumption that men who exercise regularly may exhibit a similar effect.

Hypothesis IV: Men who spend the most time reading fitness-related magazines will show greater muscularity and body-image concerns than peers.

Pope et. al. (2000) argue that media images typified by those present in men's fitness magazines fuel muscularity concerns and contribute to the development of the Adonis complex. This hypothesis will provide an initial empirical test of this assertion.

CHAPTER II

METHOD

Participants

Participants were recruited from the undergraduate research pool in the Department of Psychology at the University of North Dakota. In exchange for involvement in this study participants were offered extra credit through the department research pool. This study included two experimental conditions: exposure to images of bodybuilders, and exposure to images of average men who are slightly out of shape. In addition to the two experimental groups, data were analyzed along criterion split for time episodes of exercising each week intended primarily to promote fitness. A criterion of three workouts per week was chosen to distinguish men who worked out regularly from those who did not. The recruitment target was 16 men per cell for a total of 64 participants. A power analysis based on Cohen's method (Cohen, 1988) suggested that a cell size of n=16 would provide *power*=.8 based on the effect sizes observed in the parallel literature for women.

Independent Variables

One independent variable, exposure to images of men, was manipulated in the present study. Participants were be randomly assigned to view a series of images depicting either 15 average men, or 15 images of competitive bodybuilders. Each man viewed only one set of images. Both sets were identical in size as well as resolution and will be shown in photo-realistic grayscale. The images in both groups came from

magazines popular among college men. The images of bodybuilders came from Weider Publications such as *Muscle and Fitness* and *Flex* or were taken at IFBB sanctioned bodybuilding competitions. The bodybuilders depicted in the slides are elite competitive bodybuilders. For the purposes of this study elite has been operationalized as men who placed in the top five of the Mr. Olympia competition (the premier bodybuilding event) within the last five years. All of the men used in this study are widely recognized as being among the most elite bodybuilders in the world and all have FFMI's well beyond the upper-limit of 26 that Pope et. al. (2000) argued represents the natural upper-bound for men not using anabolic steroids. The slides depicted men from at least the waist up, and did not include any weight equipment or related apparatuses. The slides were specifically chosen for how well they represent the goals set forth by men's fitness magazines for the average man to strive towards. The non-bodybuilder images were difficult to locate. Men who are anything other than extraordinarily lean are not often shown without shirts. Because all of the bodybuilders were depicted shirtless, it was decided that the average men should also be shown without tops. The only suitable source of images located for use in this study were the "before" pictures used in "before and after" ads for fitness products. Care was taken to select only images that were neither too muscular nor too fat. The images were matched for the angle of the pictures (number from the front, side etc.) and the number of men from minority groups depicted. Both series of images are included as Appendix A.

A second variable which will was used as a grouping variable for analysis is exercise level. Information regarding frequency and type of exercise as well wais collected in the demographic package. Data for both groups, those viewing bodybuilders

and people seeing average men, were analyzed in conjunction with exercise status (≥3 times per week, or less than 3 times per week) to examine any interaction effects.

Dependent Measures

Dependent measures employed in the present study included indices of eating pathology, mood state, body-image disturbance, muscularity concerns and pre-occupation with exercise and physique.

Eating Attitudes Test-26 (Garner, Olmsted, Bohr & Garfinkel, 1982). The EAT-26 is the short form of the Eating Attitudes Test (Garfinkel, 1979) and has been shown comparable to the longer version (r=.98) (Garner et. al., 1982). Participants respond to 26 statements using a 7 point Likert-type scale where 1 = "statement definitely applies to me" and 7 = "statement definitely does not apply to me". The test developers demonstrated that the EAT-26 can reliably distinguish between people who have an eating disorder and those who do not in 84% of cases. The developers suggested that scores of 20 or higher on the EAT-26 are considered suggestive of pathological eating patterns. Only the three most extreme responses to each item contribute to increasing the score on the EAT-26. Higher scores are suggestive of greater eating pathology. The test developers established separate norms for eating disordered and non-eating disordered samples. The mean for non-disordered population is 9.9 (SD=9.2) while the eating disordered population has scored considerably higher (M=36.1, SD=17.0). Research has identified 3 factors on the EAT-26 however it has been suggested that the composite score is comparable for most research purposes. Garner et. al. (1982) proposed that the 3 factor scores be used when attempting to distinguish anorexia from bulimia, but for all

other purposes the composite score should be used. The EAT-26 has a reported internal consistency of *alpha*=.90 (Garner et. al., 1982). The EAT-26 is included as Appendix B.

Body Shape Questionnaire (Cooper, Taylor, Cooper & Fairburn, 1987). The Body Shape Questionnaire (BSQ) is intended to index the extent to which a person's body-image is disturbed or distorted. The BSQ consists of 34 situations which participants must indicate the extent to which he or she experiences a given situation on a six-point Likert scale. Norming analyzed both eating disordered and non-eating disordered samples due to the central role of body image disturbance plays in eating disorders. The mean score for eating disordered samples is 136.9 (*SD*=22.5) whereas the non-disordered sample produced a mean of 71.9 (*SD*=23.6) (Cooper et. al., 1987). Clearly, higher scores are indicative of greater body-image disturbance. Halpin and Fitzgerald (1992) suggested mean BSQ scores of 55.9 for men "unconcerned" with body-image and 109 for "concerned" men. These means were used for the present study as they were derived exclusively using samples of men. The BSQ has demonstrated good reliability and validity (Cooper et. al., 1987). It correlates significantly with the EAT-26, EDI and was found to reliably distinguish people with eating disorders from those without pathological eating patterns as determined by clinical diagnosis. Further the BSQ has been widely utilized in the research literature. The BSQ has been modified slightly for use in the present study consistent with past studies using the BSQ with men. Examples include substituting the word "woman" with "man" and replacing "thin" with "lean" or "muscular" depending on the context. The BSQ is included as Appendix C.

Swansea Muscularity Attitudes Questionnaire (Edwards & Launder, 2000). The SMAQ is a brief 20 item questionnaire examining the attitudes men hold towards

muscularity. This inventory consists of two subscales, drive for muscularity and positive attributes of muscularity. The mean score for the drive for muscularity scale (DFM) is 8.21 (*SD*=.43) for non-disordered samples and the positive attributes of muscularity scale (PAM) has a mean of 3.58 (*SD*=.28) in normal samples (Edwards & Launder, 2000). This instrument has not been widely utilized in the research literature, however it does have adequate internal consistency and criterion validity with *Chronbach's Alpha* of .94 for DFM and .91 for PAM (Edwards & Launder, 2000). The Swansea is included as Appendix D.

Adonis Complex Questionnaire (Pope et. al., 2000). The Adonis Complex Questionnaire is a 13 item survey examining the degree to which a man has engaged in various activities related to both body obsession and body-image disturbance. A sample of college men produced a mean score of 4.6 (*SD*=3) whereas a sample drawn from a "serious gym" yielded a mean of 9.8 (*SD*=6) (Pope et. al., 2000). The authors suggested a cut score of 20 for an indication of clinical concern based on use in their research lab. The Adonis Complex Questionnaire is included as Appendix E.

Profile of Mood States (McNair, Lorr & Droppleman, 1971). The Profile of Mood States (POMS) is a 67 item questionnaire addressing the extent to which each of 67 adjectives describes a participants' current mood. This instrument has been shown sensitive to pre-post changes in a variety of contexts and has been widely utilized with athletes in the sports psychology literature (LeUnes & Burger, 2000). The profile has been shown to have a consistent factor structure and good reliability, with reliabilities in the .90s, save for the confusion-bewilderment scale in the mid .80s (Norcross,

Guadagnoli & Prochaska, 1984; McNair et. al, 1971). The POMS is included as Appendix F.

Covariates

Independent measures for this study not subject to experimental manipulation included exercise frequency, type of exercise, magazines read regularly and body composition. Body composition was quantified as a participant's Fat-Free Mass Index (Kouri et. al., 1995) calculated by measuring each man's height using a standard tape measure and weight on a scale that also provides percent body fat based on electrical impedance. Height, weight and approximate percent body fat provide adequate information to calculate the FFMI. Frequency and type of exercise were obtained using a self-report questionnaire (see Appendix G). Magazine readership was determined using a self-report checklist included in the demographic package (see Appendix H). Participants were asked to indicate which magazines they read regularly, defined as more than half of the issues published in the course of a year, and approximately how long they spend reading each issue. While these variables were not manipulated, any significant relationships among them could be important contributions to the literature. A brief questionnaire package was devised for the present study to obtain basic background information. This packet included age, ethnicity, year in school, major, frequency and type of exercise, history of eating disorders, use of performance enhancing supplements and steroid use. The demographics packet is included as Appendix I.

Procedure

Participants were first given a brief description of what involvement in the study would require. After the briefing, participants were advised of the rights of research

participants and were asked to provide informed consent to participation. The demographics package, EAT-26, Adonis Complex Questionnaire, BSQ, Swansea and POMS were then administered. Each of these instruments were self-report questionnaires or indexes completed using paper and pencil only. Each participant was randomly assigned to view either the images of bodybuilders or average men. Every participant viewed only one set of images. Each participant was instructed to carefully study each image for at least 20 seconds because a test of recognition would take place later in the study. This interval was roughly based on meta-analysis of the women's exposure literature as the interval likely to maximize pre-post changes (Groesz et. al., 2002). After viewing the images participants were asked to complete the BSQ, Swansea and POMS a second time. The men were next debriefed regarding the deception (stating that a test of recall would follow the images) and the purpose of the study. Participants were thanked for taking part in the study and provided contact information to obtain the results if desired.

CHAPTER III

RESULTS

Sample characteristics

Sixty-five participants were recruited from the undergraduate research pool at the University of North Dakota and from gym facilities around two Midwestern state universities. Thirty-two participants worked out an average of less than three times per week at the time they completed this research protocol. Thirty-three participants worked out an average of three times each week or more at the time they completed this study. Participants had a mean age of 27.24 years (*SD*=7.98). The mean number of minutes of aerobic exercise per week was 82.86 (*SD*=60.47), the mean minutes of anaerobic (resistance) training was 63.85 (*SD*=101.33) and mean calisthenics training was 41.77 (*SD*=57.16). The mean age for beginning to seriously exercise was 19.55 (*SD*=8.24). No clients endorsed steroid use in their lifetime, however 43% of the sample endorsed having used legal over the counter supplements. Participants had a mean height of 69.75 inches (*SD*=2.9), a mean weight of 199.75 pounds (*SD*=39.05) and a mean percent body fat of 23.07 (*SD*=8.53). This corresponds to a mean fat free mass index of 22.02 (*SD*=3.07).

Table 1. Variable characteristics

	Works Out			Does Not Work Out			Total		
Variable	Mean	Standard Deviation	Median	Mean	Standard Deviation	Median	Mean	Standard Deviation	Median
Age	25.64	7.46	24.00	28.91	8.28	26.50	27.25	7.98	25.00
Aerobic Exercise	123.64	57.37	125.00	40.81	23.64	35.00	82.86	60.48	60.00
Resistance Exercise	111.21	124.16	110.00	15.00	20.87	10.00	63.85	101.33	30.00
Calisthenics	69.39	68.86	60.00	13.28	14.12	15.00	41.77	57.16	20.00
Workout Age	18.33	8.14	17.00	20.81	8.28	18.00	19.55	8.24	17.00
Fitness Magazines	47.27	59.96	50.00	20.31	25.96	0.00	34.00	48.05	10.00
Other Magazines	70.15	76.51	30.00	84.38	103.98	45.00	77.15	90.64	45.00
Height	70.29	1.90	70.00	69.22	3.64	68.75	69.76	2.92	70.00
Weight	187.20	34.51	195.00	212.69	39.73	218.50	199.75	39.05	202.50
Percent Body Fat	18.36	5.81	16.50	27.93	8.21	28.00	23.07	8.53	21.80
Fat Free Mass Index	21.55	2.27	21.86	22.49	3.70	23.82	22.02	3.07	22.76
Pre Exposure Tension	50.33	7.60	49.00	50.13	7.13	50.00	50.23	7.32	49.00
Pre Exposure Depression	50.73	6.25	48.00	51.03	5.88	50.00	50.88	6.03	49.00
Pre Exposure Anger	51.70	6.36	51.00	49.19	5.70	46.00	50.46	6.13	51.00
Pre Exposure Vigor	43.33	11.29	48.00	45.31	6.74	48.00	44.31	9.31	48.00
Pre Exposure Fatigue	52.48	8.91	49.00	52.78	6.51	53.00	52.63	7.76	53.00
Pre Exposure Confusion	211.39	36.14	207.00	208.56	18.99	208.00	210.00	28.80	208.00
Pre Exposure DFM	10.48	6.95	10.00	10.53	9.46	9.50	10.51	8.21	10.00
Pre Exposure PAM	5.70	6.26	2.00	3.84	3.39	3.50	4.78	5.10	3.00
Eating Attitudes 26 Score	9.58	8.93	8.00	5.31	3.20	3.00	7.48	7.03	4.00
Adonis Complex Questionnaire	4.94	4.81	3.00	4.84	3.94	3.50	4.89	4.37	3.00
Pre Exposure BSQ	71.76	25.55	70.00	72.69	30.63	63.00	72.22	27.94	63.00
Tenion change	1.73	7.86	0.00	1.31	8.49	0.00	1.52	8.11	0.00
Depression Change	5.09	6.39	7.00	1.09	5.31	0.00	3.12	6.17	2.00
Anger change	6.67	10.18	7.00	1.66	6.96	1.00	4.20	9.04	3.00
Vigor change	-0.76	8.44	-2.00	-3.69	7.35	-3.00	-2.20	8.00	-3.00
Fatigue change	-0.58	9.39	-1.00	-4.00	4.04	-3.00	-2.26	7.41	-3.00

Table 1. Cont.	Works Out			Does Not Work Out			Total		
Variable	Mean	Standard Deviation	Median	Mean	Standard Deviation	Median	Mean	Standard Deviation	Median
Confusion change	4.67	5.00	5.00	3.44	6.47	5.00	4.06	5.76	5.00
BSQ Change	5.67	22.54	0.00	-7.63	9.78	-5.00	-0.88	18.58	-4.00
DFM Change	0.88	2.67	0.00	-0.97	2.65	0.00	-0.03	2.79	0.00
PAM Change	1.82	2.44	0.00	2.78	3.99	0.00	2.29	3.31	0.00

Variables Included in the Analysis

Age: This variable is the client's age in years. The distribution of scores was positively skewed centering around 24. The distribution had the following characteristics: *N*=65 *M*=27.24 *Median*=25, *SD*=7.98

Aerobic exercise: This variable is the average number of minutes per week of aerobic and cardiovascular exercise the participant reported. The distribution was tri modal centering around 30, 60 and 80. The distribution had the following characteristics: *N*=65 *M*=82.86 *Median*=30, *SD*=101.33

Anaerobic exercise: This variable is the average number of minutes per week of anaerobic and resistance training the participant reported. The variable was approximately linearly distributed with negative slope. The distribution had the following characteristics: *N*=65 *M*=63.85 *Median*=60, *SD*=60.47

Workout age: This variable is the age at which the participant reported he began to work out "seriously". The variable was approximately normally distributed centering around 18. The distribution had the following characteristics: *N*=65 *M*=19.55 *Median*=17, *SD*=8.23

Fitness Magazines: This variable is the number of minutes per month the participant reported spending reading magazines which are primarily fitness oriented such as Muscle and Fitness, Flex, Iron Man, Men's Health and MuscleMag. The

distribution of this variable was negatively skewed with a modal response of 0 minutes and a increased frequency surrounding 60 minutes. The distribution had the following characteristics: *N*=65 *M*=34 *Median*=10, *SD*=48.05

Other Magazines: This variable is the number of minutes per month the participant reported spending reading magazines which are not primarily fitness oriented such as *PC Gamer, Newsweek, Maxim, Rolling Stone* and *Popular Science*. The distribution of this variable was positively skewed with no clear central value. The distribution had the following characteristics: *N*=65 *M*=77.15 *Median*=45, *SD*=90.64

Height: This variable is the participant's height in inches. It is approximately normally distributed around a value of 70 inches. The distribution had the following characteristics: *N*=65 *M*=69.76 *Median*=70, *SD*=2.92

Weight: This variable is the participant's weight in pounds. The variable is linearly distributed with flat slope. The distribution had the following characteristics: *N*=65 *M*=199.74 *Median*=202.5, *SD*=39.05

Percent Bodyfat: This variable is the percent bodyfat recorded for the participant at the time data were collected. It has a saw-toothed distribution with no clear central value. The distribution had the following characteristics: *N*=65 *M*=23.07 *Median*=21.8, *SD*=8.52

Fat Free Mass Index (FFMI): This variable is the FFMI calculated for the participant based on measurements taken at the time other data were collected. It is approximately linearly distributed with flat slope. The distribution had the following characteristics: *N*=65 *M*=22.02 *Median*=22.76, *SD*=3.07

Tension-anxiety: This variable is the T value for tension-anxiety from the Profile of Mood States obtained prior to exposure to the images of men. The distribution is approximately normal centering around 49. The pre-exposure distribution had the following characteristics: *N*=65 *M*=50.23 *Median*=49, *SD*=7.32

Depression-dejection: This variable is the T value for depression-dejection from the Profile of Mood States obtained prior to exposure to the images of men. The distribution is bimodal with peaks of 46 and 56. The pre-exposure distribution had the following characteristics: N=65 *M*=50.88 *Median*=49, *SD*=6.03

Anger-hostility: This variable is the T value for anger-hostility from the Profile of Mood States obtained prior to exposure to the images of men. The distribution is bimodal with peaks of 46 and 52. The pre-exposure distribution had the following characteristics: *N*=65 *M*=50.46 *Median*=51, *SD*=6.13

Vigor-activity: This variable is the T value for vigor-activity from the Profile of Mood States obtained prior to exposure to the images of men. The distribution is irregularly distributed with a mode of 47. The pre-exposure distribution had the following characteristics: *N*=65 *M*=44.31 *Median*=48, *SD*=9.32

Fatigue-inertia: This variable is the T value for fatigue-inertia from the Profile of Mood States obtained prior to exposure to the images of men. The distribution is bimodally distributed with modes of 48 and 53. The pre-exposure distribution had the following characteristics: *N*=65 *M*=52.63 *Median*=53, *SD*=7.76

Confusion-bewilderment: This variable is the T value for confusion-bewilderment from the Profile of Mood States obtained prior to exposure to the images of men. The

distribution is bimodally distributed with modes of 44 and 56. The pre-exposure distribution had the following characteristics: *N*=65 *M*=50.1, *Median*=53, *SD*=8.26

EAT-26: This variable is the participants' composite score from the EAT-26. As previously discussed, research indicates that the composite score is as useful as the individual scale score, but may be more reliable. This variable was irregularly distributed with no clear modal value. Six participants scored above the suggested score of 20 for clinical concern. These men were referred to appropriate local resources and encouraged to follow-up with a mental health profession regarding their potentially problematic eating behaviors and attitudes. The distribution had the following characteristics: *N*=65 *M*=7.48, *Median*=4, *SD*=7.03

Drive for muscularity (DFM): This variable is the drive for muscularity subscale of the Swansea Muscularity Attitudes Questionnaire. The distribution of this variable was saw-toothed without a clear central value. The pre-exposure distribution had the following characteristics: *N*=65 *M*=10.51, *Median*=10, *SD*=8.21

Positive attributes of muscularity (PAM): This variable is the positive attributes of muscularity subscale of the Swansea Muscularity Attitudes Questionnaire. The distribution of this variable was bimodally distributed centering around 0 and 8. The pre-exposure distribution had the following characteristics: *N*=65 *M*=4.78, *Median*=3, *SD*=5.10

Adonis complex questionnaire (ACQ): This variable is the score on the Adonis complex questionnaire. The distribution was bimodal centering around 0 and 10. The pre-exposure distribution had the following characteristics: *N*=65 *M*=4.89, *Median*=3, *SD*=4.37

Body shape questionnaire (BSQ): This variable is the score on the body shape questionnaire. The distribution was sawtoothed with no clear central value. The pre-exposure distribution had the following characteristics: *N*=65 *M*=72.21, *Median*=63, *SD*=27.9

Dependent Variables

Tension-anxiety change: This variable is the change in T value for tension-anxiety from the Profile of Mood States obtained prior to exposure to the images of men. The distribution was bimodal centering around -2 and 10. The pre-exposure distribution had the following characteristics: *N*=65 *M*=1.52 *Median*=0, *SD*=8.11

Depression-dejection change: This variable is the change in T value for depression-dejection from the Profile of Mood States obtained prior to exposure to the images of men. The distribution was sawtoothed centering around 0. The pre-exposure distribution had the following characteristics: *N*=65 *M*=3.12 *Median*=2, *SD*=6.17

Anger-hostility change: This variable is the change in T value for anger-hostility from the Profile of Mood States obtained prior to exposure to the images of men. The distribution was sawtoothed centering around 0. The pre-exposure distribution had the following characteristics: *N*=65 *M*=4.2 *Median*=3, *SD*=9.03

Vigor-activity change: This variable is the change in T value for vigor-activity from the Profile of Mood States obtained prior to exposure to the images of men. The distribution was symmetrical with a central value of -3. The pre-exposure distribution had the following characteristics: *N*=65 *M*=-2.2 *Median*=-3, *SD*=8.00

Fatigue-inertia change: This variable is the change in T value for fatigue-inertia from the Profile of Mood States obtained prior to exposure to the images of men. The

distribution was symmetrical with a central value of -3. The pre-exposure distribution had the following characteristics: *N*=65 *M*=-2.26 *Median*=-3, *SD*=7.41

Confusion-bewilderment change: This variable is the change in T value for confusion-bewilderment from the Profile of Mood States obtained prior to exposure to the images of men. The distribution was approximately normal with a central value of 5. The pre-exposure distribution had the following characteristics: *N*=65 *M*=4.06, *Median*=5, *SD*=5.75

Drive for muscularity (DFM) change: This variable is the change in drive for muscularity subscale of the Swansea Muscularity Attitudes Questionnaire. The distribution was approximately normal with a central value of 0. The pre-exposure distribution had the following characteristics: *N*=65 *M*=-.03, *Median*=0, *SD*=2.79

Positive attributes of muscularity (PAM) change: This variable is the change in positive attributes of muscularity subscale of the Swansea Muscularity Attitudes Questionnaire. The distribution of this variable was positively skewed centering around 0. The pre-exposure distribution had the following characteristics: *N*=65 *M*=2.29, *Median*=0, *SD*=3.30

Body shape questionnaire (BSQ) change: This variable is the change in score on the body shape questionnaire. The distribution was sawtoothed with a central value of -5. The pre-exposure distribution had the following characteristics: *N*=65 *M*=-.88, *Median*=-4, *SD*=18.56

Table 2. Bivariate correlations

	Age	Aerobic	An-aerobic	Workout age	Fitness	Other	Height	Weight	Body Fat	FFMI	Tens	Dep.	Anger	Fatigue	Conf.	Vigor	DFM	PAM	BSQ	ACQ	EAT
Age	X	-.412 ***	-.165	.591 ***	-.308 *	.299 *	-.015	.324 ***	.280 *	.260 *	.167	-.192	.164	.259 *	-.179	-.091	-.345 ***	-.330 ***	-.200	-.237	-.338 ***
Aerobic		X	.613 ***	-.238	.431 ***	-.169	.140	-.281 *	-.427 ***	-.156	.054	.156	.216	.077	.056	-.062	.276 *	.533 ***	.236	.315 *	.545 ***
Anaerobic			X	-.120	.384 ***	.111	.207	-.006	-.166	-156	.022	.173	.302 *	-.055	-.106	.138	.264 *	.271 *	.147	.151	.153
Workout Age				X	-.029	.473 ***	-.020	.370 ***	.307 ***	.329 **	.156	-.191	.073	.320 ***	-.070	.078	-.292 ***	-.213	-.148	-.054	-.256 *
Fitness					X	-.088	.026	.277 *	.135	.298 *	.033	.105	.166	.186	-.180	.086	.428 ***	.439 ***	.408 ***	.434 ***	.381 **
Other						X	.128	.167	.124	.054	-.013	-.084	.041	.156	-.116	-.119	-.248 *	-.073	-.128	-.124	-.132
Height							X	-.055	-.334 **	-.472 ***	.269 *	-.061	.230	-.289 *	.076	-.141	-.206	.061	-.053	-.055	.211
Weight								X	.839 ***	.817 ***	.292 *	.154	-.080	.387 ***	.021	.051	.334 **	.171	.577 ***	.508 ***	.118
Body Fat									X	.643 ***	.221	.20	.054	.239	.156	-.024	.302 *	.009	.422 ***	.331 **	-.144
FFMI										X	.100	.096	-.096	.251 *	-.154	-.018	.375 **	.223	.503 ***	.223	.142
Tension											X	.331 **	-.299 *	.723 ***	.627 ***	.374 **	-.063	.168	.052	.083	.092
Dep.												X	.076	.259 *	.385 **	-.363 **	.544 ***	.571 ***	.501 ***	.502 ***	.269 *
Anger													X	.224	.008	-.208	-.178	.064	-.112	-.165	-.121
Fatigue														X	.184	-.349 ***	.048	.352 ***	.182	.272	.324 ***
Conf.															X	.021	-.075	-.111	-.056	-.113	-.179
Vigor																X	-.059	-.360 ***	-.155	-.199	-.250
DFM																	X	.569 ***	.846 ***	.838 ***	.569 ***
PAM																		X	.734 ***	.829 ***	.803 ***
BSQ																			X	.920 ***	.695 ***
ACQ																				X	.742 ***
EAT																					X

* significant at p=.05 level, ** significant at p =.01 level, *** significant at p =.001 level

Univariate Tests

A one-way ANOVA on EAT-26 scores grouped by workout status was significant ($F(1,63)=6.489, p<.05$). An examination of the group means revealed that the group that worked out regularly had a mean EAT-26 score $M=9.58$ while the group that did not workout regularly had a mean score M=5.31.

Multivariate Tests

A multivariate analysis of variance (MANOVA) was conducted with the above specified dependent variables to determine what predictor variables were significantly related to changes in dependent variables post-exposure. The analysis revealed a significant effect for workout status (*Wilks' Lambda*=.406, $F(9, 30)=4.884$, $p=.001$, *partial eta squared*=.251). The analysis also revealed a significant effect for exposure condition status (*Wilks' Lambda*=.283, $F(9, 30)=8.437$, $p<.001$, *partial eta squared*=.717). There was a significant interaction effect for workout status X exposure condition (*Wilks' Lambda*=.362, $F(9, 30)=5.879$, $p<.001$, *partial eta squared*=.638). Univariate analyses (*t-tests*) were used to follow up the variables that differed significantly.

Table 3. Significant group differences by workout status in post exposure differences on variables

Variable	Works out	Does not Work out	Partial Eta Squared	95% CI for difference
DFM	-1.24 (.36)	1.14 (.37)	.251	.92-3.84
Depression	5.87 (1.10)	.356 (1.13)	.158	1.00-10.03
Fatigue	1.62 (1.00)	-6.19 (1.03)	.311	3.68-7.86

*= significant at alpha =.05 with Bonferroni correction

For workout status pairwise analyses were used to examine group differences on change scores post exposure. The Bonferroni correction was applied to control family-wise type I error rate with family-wise alpha set to .05. Significant mean differences were found for DFM ($M=2.38$), depression change ($M=5.52$) and fatigue ($M=7.80$). Follow up for

the BSQ change after exposure revealed a trend towards a difference (M=10.98, p=.071). There was also a trend toward an increase in anger 7.50, p=.057). Table 3 summarizes the significant differences.

Table 4. Significant group differences by exposure condition on post exposure changes

Variable	Ideal	Normal	Parital Eta Squared	95% CI for difference
DFM	1.55 (29)	-1.65 (.29)	.512	2.04 - 4.38
PAM	3.44 (.24)	1.09 (.25)	.439	1.36 - 3.34
Depression	1.19 (.89)	5.04 (.90)	.136	.24 - 7.47
Vigor	.084 (.78)	-4.63 (.79)	.233	4.70 - 7.9
Fatigue	-4.48 (.81)	-.10 (.82)	.196	1.08 - 7.68

*= significant at alpha =.05 with Bonferroni correction

For exposure condition pairwise analyses revealed significant group differences in post-exposure changes for PAM (M=2.35), DFM (M=3.21), depression (M=3.85), vigor (M=4.71) and fatigue (M=4.38). Table 4 summarizes significant group differences for exposure condition.

Table 5. Summary of significant group differences in post exposure variable changes within the workout X exposure interaction

Variable	Group differences
Drive for Muscularity	Works out/normal decreased DFM more than all other conditions
	Does not work out/ideal increased DFM more than non-workout/normal
Positive Attributes of Muscularity	Works out/ideal increased PAM vs. all other conditions
	Does not work out/ideal increased PAM more than both normal conditions
Depression	Works out/normal increased more than. all other conditions
	Works out/ideal increased more than. non-workout conditions
Vigor	Work out/normal decreased more than all other conditions
	Does not work out/normal decreased more than both ideal conditions
Fatigue	Does not work out/ideal decreased more than all other conditions
	Does not work out/normal decreased more than both workout conditions
	Works out/normal increased more than all other conditions

*= significant at alpha =.05 with Tukey correction

The exposure X work-out interaction pairwise analyses were computed using the Tukey correction (k=4, df=15, q=4.076, $alpha$=.05) to further control for family-wise error rate which was set to $alpha$ = .05. Table 5 shows the significant interaction effects. Figures 4-8 graphically illustrate the interaction effects that were identified using the Tukey correction. For DFM the group which worked out regularly and viewed slides of normal men showed a greater decrease in DFM post-exposure versus all three other conditions. The group which did not work out regularly and viewed slides of competitive bodybuilders showed significantly increased DFM versus the group which did not work out and viewed slides of normal men. For PAM the group which worked out regularly and viewed slides of bodybuilders showed significantly greater increases in PAM than all other conditions. The group which did not work out regularly and viewed slides of body builders showed significant increases in PAM versus both groups viewing slides of normal men. For changes in depression, the group which worked out and viewed normal men showed significantly greater increased depression than all other conditions. The men who worked out and viewed images of bodybuilders showed significantly greater increase in depression compared to both conditions with men who did not work out regularly. For vigor change post exposure, men who worked out and viewed images of normal men showed a significantly greater decrease in vigor than all other conditions. The group which did not work out and viewed slides of normal men showed significantly greater decreases in vigor compared to both conditions which viewed images of bodybuilders. For changes in fatigue, the group which did not work out and viewed images of bodybuilders showed a significantly greater decrease in fatigue when compared with all other conditions. The condition which did not work out and viewed

normal men showed a significantly greater decrease in fatigue when compared to both groups which work out regularly. The group which did work out regularly and viewed slides of normal men showed greater fatigue increases than all other conditions.

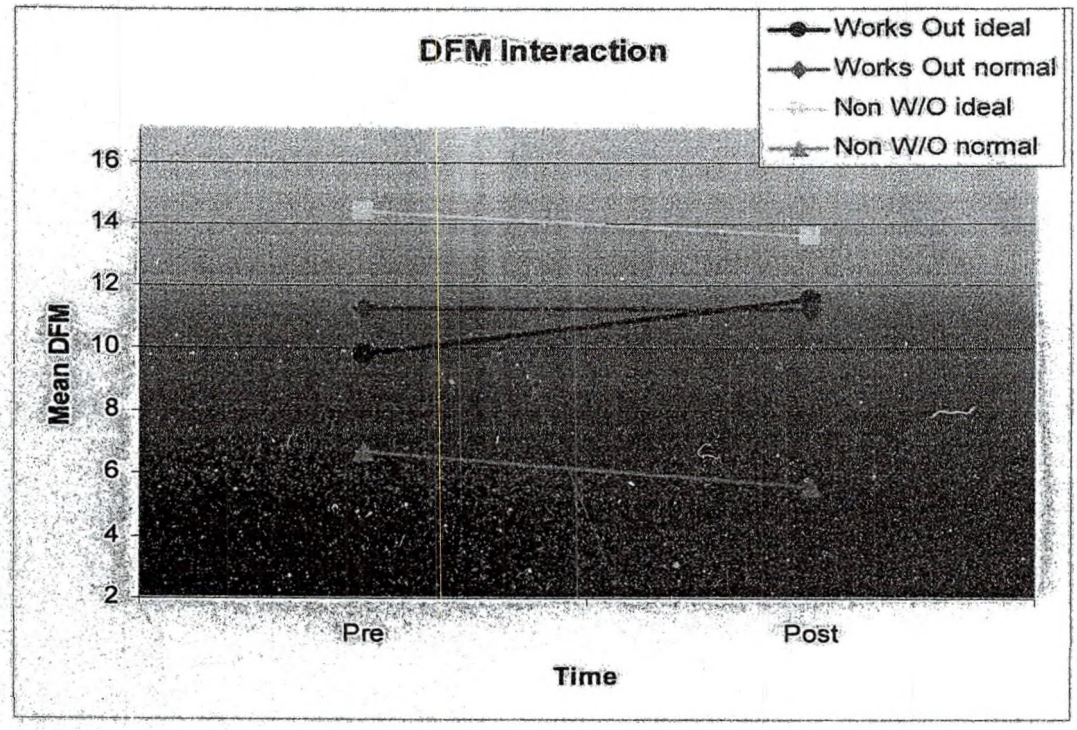


Figure 4. DFM interaction

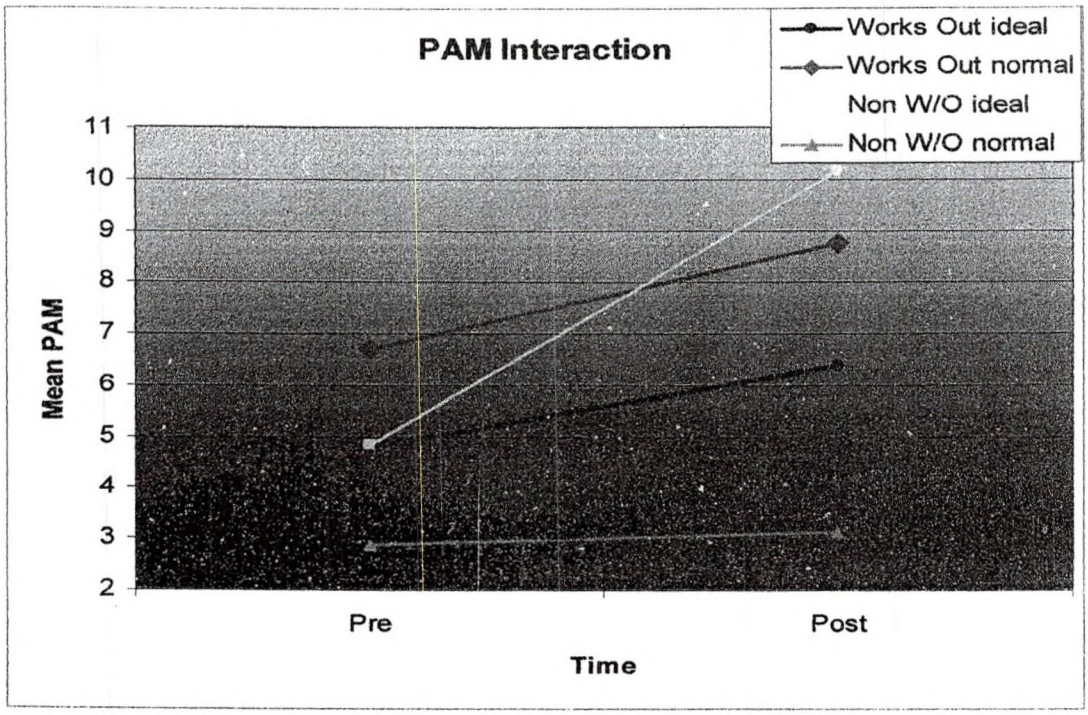


Figure 5. PAM interaction

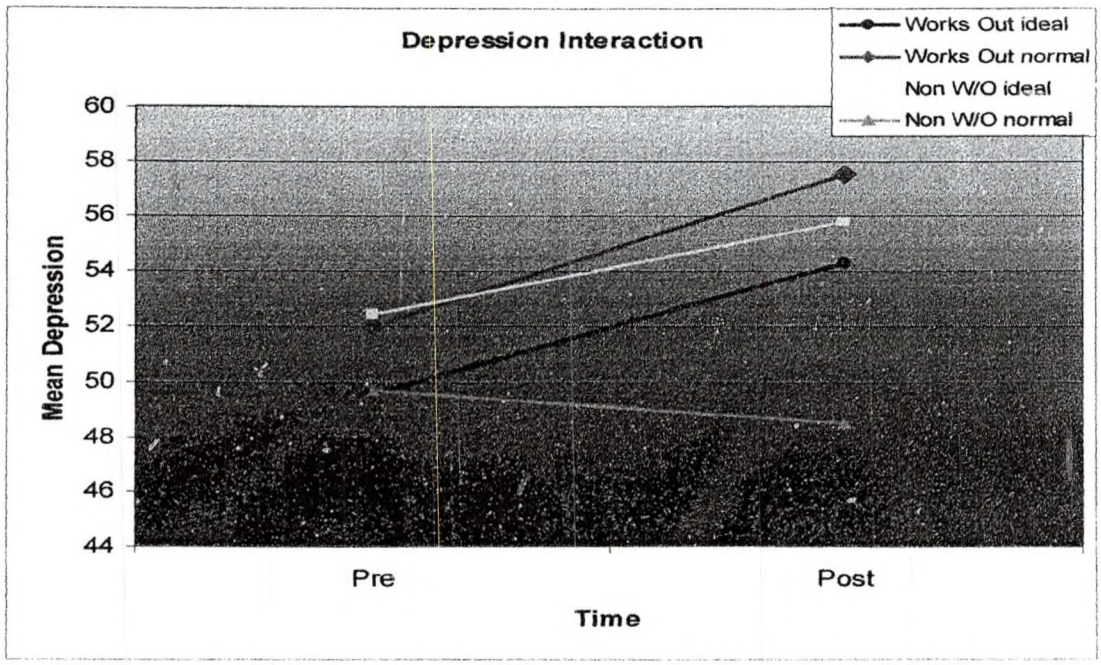


Figure 6. Depression interaction

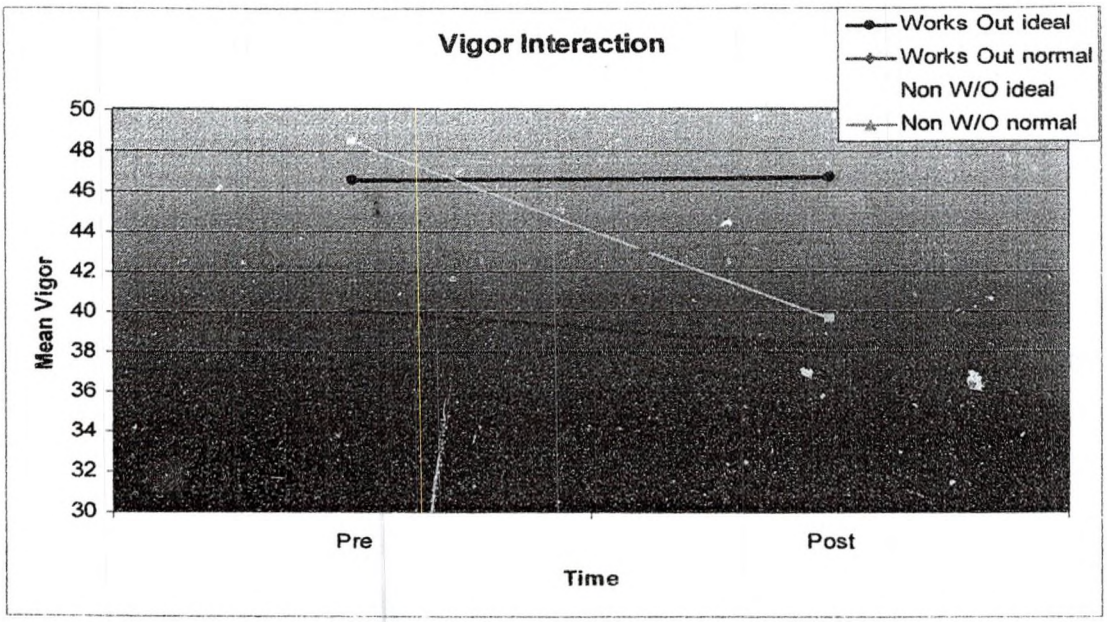


Figure 7. Vigor interaction

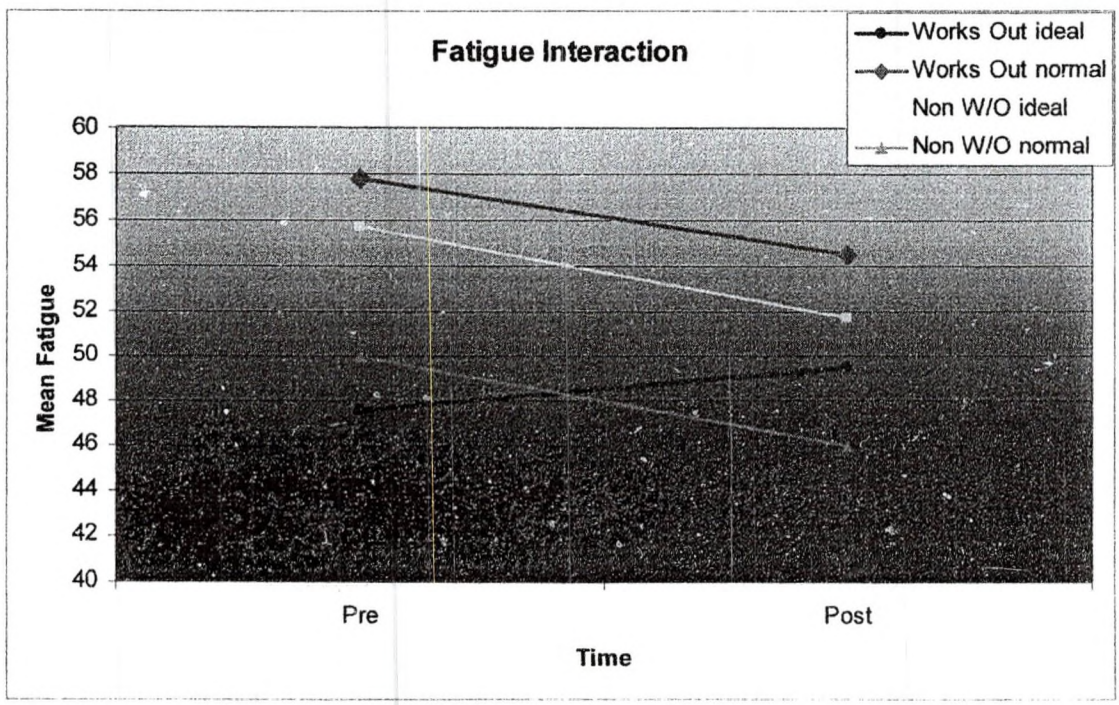


Figure 8. Fatigue interaction

Multiple linear regression analysis was conducted on significant MANOVA effects to determine what factors may predict who will experience changes in mood and

muscularity concerns following exposure to images like those used in this study. For DFM in participants who viewed bodybuilders multiple regression revealed that aerobic exercise (β=.579), pre exposure anger (β=.315), p; exposure PAM (β=1.038), time spent reading non-fitness magazines (β=.202), pre-exposure fatigue (β=.197) predicted increases in DFM after viewing the images. EAT-26 score (β=-.451), time spent on resistance training (β=-.406), pre-exposure confusion (β=-.335), pre-exposure depression (β=-.475) and percent body fat (β=-.204) predicted decreased change in DFM after viewing these images. For participants viewing normal men , minutes per week engaged in aerobic activity (β=.365) and time spent reading non-fitness magazines (β=.286) predicted increases in DFM post exposure. Pre-exposure anger (β=-.735) predicted decreased change in DFM after viewing the images. Tables 6 and 7 summarize these data

Table 6. DFM regression for men viewing bodybuilders

R	R^2	Adjusted R^2
.993	.986	.980

Predictor	Beta Weight	t	Significance	Correlations Zero-order	Partial	Part
Aerobic	.579	8.65	.000	.729	.879	.218
EAT-26	-.451	-6.21	.000	.555	-.798	-.157
Anger	.315	6.10	.000	.359	.793	.154
Other Magazines	.202	5.92	.000	.136	.784	.149
Resistance Training	-.406	-8.07	.000	.324	-.865	-.204
Confusion	-.335	-5.94	.000	-.332	-.785	-.150
PAM	1.038	11.64	.000	.539	.928	.294
Depression	-.475	-7.82	.000	-.140	-858	-.198
Fatigue	.197	4.04	.001	-.139	.653	.102
Percent Body Fat	-.204	-3.19	.004	-.466	-.563	-.081

Table 7. DFM regression for men viewing normal men

R	R^2	Adjusted R^2
.793	.629	.589

Predictor	Beta Weight	t	Significance	Correlations Zero-order	Partial	Part
Anger	-.669	-4.933	.000	-.699	-.764	-.723
Aerobic	-.451	-6.21	.000	.188	.503	.355
Other magazines	.315	6.10	.020	.237	.421	.283

For the variable PAM in participants viewing bodybuilders, score on the Adonis Complex Questionnaire (β=.532), pre-exposure DFM (β=.474), pre-exposure vigor (β=.197) and pre-exposure confusion (β=.181) predicted increases in PAM following exposure to the images. Time spent in resistance training (β=-.268) predicted decreased change in PAM following viewing the images. Table 8 summarizes these data.

Table 8. PAM regression for men viewing bodybuilders

R	R^2	Adjusted R^2
.984	.968	.962

Predictor	Beta Weight	t	Significance	Correlations Zero-order	Partial	Part
ACQ	.532	5.60	.000	.921	.733	.193
Anaerobic exercise	-.268	-7.11	.000	-.223	-.808	-.245
DFM	.474	4.96	.000	.879	.690	.171
Vigor	.197	5.15	.000	-.042	.704	.178
Confusion	.181	4.68	.000	.052	.669	.161

For the variable vigor change on the POMS in participants viewing images of normal men both minutes spent per week in resistance training (β=-.441) and pre-exposure confusion (β=-.330) predicted decreased vigor following viewing the pictures. Table 9 summarizes these data.

Table 9. Vigor regression for men viewing normal men

R	R^2	Adjusted R^2
.543	.295	.246

Predictor	Beta Weight	t	Significance	Correlations Zero-order	Partial	Part
Anaerobic exercise	-.441	-2.82	.008	-.431	-.464	-.440
Confusion	-.330	-2.12	.043	-.318	-.366	-.330

For fatigue change on the POMS in participants viewing normal men, the minutes spent in resistance training per week (β=.402) predicted increases after viewing the images. Scores on the EAT-26 (β=-.752) and age at which the participant first began to work out (β=-.653) were associated with decreases in fatigue after viewing the images. For those participants viewing bodybuilders, pre-exposure vigor (β=.238) was associated with increased fatigue while age (β=-.617) and time spent reading fitness magazines per month (β=-.529) were associated with decreased fatigue post exposure. Tables 10 and 11 summarize these data.

Table 10. Fatigue regression for men viewing normal men

R	R^2	Adjusted R^2
.779	.607	.565

Predictor	Beta Weight	t	Significance	Correlations Zero-order	Partial	Part
Workout age	-.653	-5.16	.001	-.478	-.698	-.612
EAT-26	-.752	-5.18	.000	-.313	-.700	-.614
Anaerobic exercise	.402	2.88	.007	.148	.479	.342

Table 11. Fatigue regression for men viewing bodybuilders

R	R^2	Adjusted R^2
.697	.486	.433

				Correlations		
Predictor	Beta Weight	t	significance	Zero-order	Partial	Part
Age	-.617	-4.01	.000	-.417	-.597	-.534
Fitness magazines	-.529	-3.49	.002	-.225	-.544	-.464
Vigor	.288	2.13	.042	.380	.367	.283

For the variable depression change post-exposure in men viewing bodybuilders, the age at which a participant first seriously worked out (β=.294), minutes per week engaged in aerobic exercise (β=.766) and score on the Adonis Complex Questionnaire (β=.178) predicted increased depression post-exposure. Present age (β=-.508), pre-exposure anger (β=-.438), time spent doing calisthenics (β=-.533), time spent reading other magazines (β=-.192) and time spent reading fitness magazines (β=-.343) predicted decreased depression post-exposure. For those men viewing images of normal men, DFM (β=.843), FFMI (β=.768), pre-exposure confusion (β=.659) predicted increased depression post-exposure. Percent body fat (β=-.324) and pre-exposure tension (β=-.336) were associated with decreased depression after viewing the images. Tables 12 and 13 summarize these data.

Table 12. Depression regression for men viewing bodybuilders

R	R^2	Adjusted R^2
.969	.939	.919

Predictor	Beta Weight	T	significance	Correlations Zero-order	Partial	Part
Age	-.508	-6.66	.000	-.760	-.806	-.336
Anger	-.438	-7.43	.000	-.448	-.835	-.375
Workout age	.294	5.35	.000	.165	.738	.270
Aerobic exercise	.766	5.86	.000	.369	.767	.259
Other magazines	-.192	-3.57	.000	-.225	-.589	-.180
Calisthenics	-.533	-4.41	.000	-.028	-.669	-.222
Fitness magazines	-.343	-3.69	.000	.275	-.559	-.185
ACQ	.178	2.14	.000	.349	.400	.108

Table 13. Depression regression for men normal men

R	R^2	Adjusted R^2
.904	.818	.783

Predictor	Beta Weight	T	significance	Correlations Zero-order	Partial	Part
DFM	.843	8.22	.000	-.760	-.806	-.336
FFMI	.768	6.61	.000	-.448	-.835	-.375
Confusion	.659	4.86	.000	.165	.738	.270
Percent body fat	-.324	-2.95	.000	.369	.767	.259
Tension	-.336	-2.53	.000	-.225	-.589	-.180

CHAPTER IV

DISCUSSION

The present study has made important contributions to the literature on male body image concerns. Previous investigations in this area have not examined the effects of exposure to media images on men despite the broad literature in this area addressing females. Main effects were identified for both exposure condition and for workout-status with significant interaction effects. This is the first evidence of changes in body-image or emotional state in men resulting from exposure to media images.

Workout status produced significant effects on drive for muscularity, as measured by the Swansea Muscularity Attitudes Questionnaire, depression and fatigue. There was also a trend (p=.071) toward a difference in body-image as measure by the Body Shape Questionnaire. The drive for muscularity effects were primarily the result of participants who regularly work out showing decreased drive after exposure, regardless of the images viewed, while participants who did not work out regularly showed an increase in drive for muscularity. This effect accounted for approximately 25% of the variance in DFM change scores post-exposure in the present sample. This may be the result of participants who work out feeling reassured that they are taking action to improve or maintain their physique while those who did not work out regularly were sensitized to muscularity issues raising awareness about one's own body.

Participants who worked out regularly showed increased depression of nearly one standard deviation following viewing the images while participants who did not work out

regularly did not show any reliable change. Workout status accounted for just over 15% of the variance in depression change scores for the present sample. This effect may result from the increased personal investment in fitness that men who work out regularly might feel. With the increased investment could come greater pressures to attain a desirable physique. In this light, viewing competitive bodybuilders may arouse feelings of not being muscular enough while viewing the normal or out of shape men could produce feelings that there is an uncomfortable level of similarity between the images viewed and one's own body.

Effects on fatigue levels observed based on workout status include a slight increase for those participants who work out regularly with a larger decrease for men who did not work out regularly. Workout status accounted for approximately 30% of the variance in this sample's change in fatigue scores post exposure. This may result from classical conditioning effects for men who work out regularly in that they might associate images of partially clothed men with their own workouts which could easily increase the level of reported fatigue. Conversely, participants who do not work out regularly might feel energized to do so upon viewing these images.

The trend toward a change in BSQ scores based on workout status was at best modest. Men who work out regularly experienced a modest increase in body-image concerns while those who do not experienced a similarly modest decrease on body-image concerns. These changes were of questionable significance as well as size (roughly one quarter of a standard deviation) and should not be considered reliable or especially meaningful. This effect accounted for only 8% of the variance in BSQ change after viewing the slides of men.

Workout status alone accounted for a moderate amount of the variance in change scores after viewing experimental slides of men. Which slides were actually viewed (exposure condition) produced considerably more robust effects across a wider array of dependent variables. Exposure condition produced main effects on PAM, DFM, depression, vigor and fatigue with the two variables indicating musculature concerns (PAM, DFM) showing particularly strong effects.

Effects on PAM based on exposure condition included a very small increase for participants viewing slides of normal men with a greater increase for those participants viewing competitive bodybuilders. Workout status accounted for approximately 44% in post exposure changes in PAM for the present sample. The images depicted bodybuilders smiling and appearing very confident. One can easily imagine these images arousing positive feelings about the men in pictures and their most prominent attributes: muscularity. The images of normal men show similar poses, though the are not depicted as nearly as confident or happy when compared to the bodybuilders.

The effects for DFM based on exposure condition included a decrease for the participants viewing normal men and a similarly sized increase for those viewing the bodybuilder images. Exposure condition accounted for 51% in post exposure change scores for DFM. This effect may result from viewing bodybuilders and thinking "I should be more muscular", even if the participant has no desire to even approach the size of the bodybuilders depicted. Conversely, upon viewing the normal men, many of the men in the present sample have similar bodies or even compared favorably to the men depicted which could lead to feeling as though one does not need further musculature.

The effects of exposure condition on change in depression consisted of a modest increase for participants who viewed bodybuilders with a far more pronounced increase for those men viewing the normal slides. This may be because the PAM effects in the group who viewed bodybuilders buffered men from the increases in depression whereas there was a much less pronounced effect on PAM in the normal group where depression changes were much more modest. Exposure condition accounted for 13% of the variance in depression change after viewing the images and was the smallest of the significant effects in the present study.

Exposure condition effects on vigor changes post-exposure included a considerable decrease in vigor for men viewing images of normal men with no reliable changes for those viewing bodybuilders. This could be due to the same buffering effect based on PAM for the men viewing bodybuilders that was hypothesized for depressive effects. Certainly the decrease in vigor would be consistent with the increased depression noted for the group viewing normal men and may represent a kind of disheartenment with one's one appearance. Exposure condition account for 23% of the variance in vigor change scores in the present sample.

Fatigue changes based on exposure condition consisted of a sizable decrease in fatigue for the men viewing bodybuilders while there was no reliable change in participants viewing normal men. The images of bodybuilders may arouse energy and a desire to improve one's own body as seen in the DFM effects. Men viewing the normal or average images had no such response as the images are not nearly as provocative as the ones of bodybuilders. Exposure condition accounted for approximately 20% of the variance in fatigue change after viewing the images.

Exposure conditions effects generally accounted for a large proportion of the variance in muscularity concerns and a moderate proportion of the variance in self-reported physical changes such as vigor and fatigue. Exposure accounted for a modest amount of variance in emotional changes (depression) which is consistent with literature on men's issues identifying much more powerful physiological than emotional reaction to stressing events and stimuli (Baraff, 1991; Pope et al., 2000).

Tukey corrections were applied to post-hoc analyses of the interaction effects in order to maintain a stringent criterion for significance while controlling for family-wise type I error rate. Examining the workout status X exposure condition interaction reveals the most interesting and informative findings of the present study.

The interaction between exposure and workout status revealed that both groups which viewed the idealized bodybuilder images showed increased PAM compared with the conditions viewing normal images and that this effect was especially pronounced in the men who worked out regularly. When examining effects on DFM it is clear that, while both conditions that viewed the bodybuilder images showed increased DFM, the only group that showed decreased DFM was the group that worked out regularly and viewed the normal images. Interestingly, this group showed the largest mean difference of any condition following exposure to the images. The conditions that used participants whom worked out regularly consistently showed the largest responses to images perhaps due to a greater personal investment in matters of fitness and the state of one's physique.

Changes on the Profile of Mood States showed a similar pattern where men who worked out regularly showed stronger noxious responses to images than did the men who worked out less frequently. For depression changes post-exposure, only those conditions

including men who worked out regularly showed significant increases in depression after viewing the images; however the group that viewed the depictions of normal men showed responses of more than twice the magnitude of the condition viewing bodybuilders. This may be due to perceived similarity between the normal men and one's self, reminding the men of the degree to which they are dissatisfied with their own bodies, whereas the idealized depiction of competitive bodybuilders is recognized as an unrealistic standard that should not be taken too seriously. The corresponding feelings of depression stemming from concerns about muscularity are much larger when comparing one's self to the ordinary men and not seeing a greater difference, than when comparing one's self to elite bodybuilders. Similarly, while all men viewing the non-bodybuilder images showed decreases in vigor, the effect was particularly strong in men who worked out regularly. The men who worked out regularly showed more than twice the decrease in vigor following exposure to images of normal men than did the men who did not work out consistently. Again, this may be due to an uncomfortably high degree of perceived similarity between one's self and the images of normal men. Those participants who worked out regularly had considerably higher personal investment in fitness in light of the more substantial devotion of time and energy to improving their physiques. Understandably this led to stronger responses to the images than men with less time or energy devoted to improving fitness. Post-hoc analyses of fatigue changes revealed that both conditions including men who did not work out regularly showed decreased fatigue. The decrease was especially pronounced in men who did not work out and viewed images of bodybuilders. These men showed more than two times the decreases of their counterparts who viewed normal men. In the conditions with men who worked out

regularly, those men who viewed normal men showed increased fatigue of roughly the same magnitude of the decrease found in men who did not work out and viewed normal images. The men who worked out and viewed the images of bodybuilders showed no reliable difference. While the men who did not work out showed similar and larger changes in response to the images they viewed, these changes were not noxious ones. That is, a decrease in fatigue is a change toward a more healthy state. This may be the result of an activation effect after viewing the images that would be consistent with the moderate increases in muscularity concerns post-exposure that were found in these conditions. The most noxious response to images again came from a condition where the participants worked out regularly; those who viewed images of normal men. It is interesting that those who viewed the normal images showed a deleterious response while those who saw bodybuilders did not exhibit a significant difference.

Linear regressions examining the significant interaction effects aid in the interpretation of what factors may have contributed to the interactive differences found in the present study. It is important to note that regression analyses can not determine causality; rather they address the factors that tended to change as the criterion did. Nevertheless, this type of analysis can serve as a valuable tool for understanding the differences between conditions.

The PAM analysis for participants viewing the images of bodybuilders (the only conditions that showed significant changes) the *adjusted* $r^2 = .962$ indicating that the factors identified in the present study could be expected to account for roughly 96% of the variance in the population were this study to be replicated. The proportion of variance accounted for is extraordinarily high for this condition. The score on the ACQ,

pre-exposure DFM, pre-exposure vigor and pre-exposure confusion contributed to increased endorsement of the positive attributes of muscularity items. The amount of time spent in resistance training played a moderating role. The ACQ and DFM can both be conceptualized as measures of investment in fitness-related pursuits and were easily the strongest predictors in the model. Time spent each week in resistance training was inversely related to participant responses to the images of bodybuilders. It is possible that this moderating effect speaks to the importance of the difference between cognitive/emotional investment in an activity versus a simple commitment of time. It is also possible that it stems from increased knowledge about reasonable expectations for muscularity. It should be acknowledged that this moderating effect of resistance training was quite unexpected and is not easily explained. Future investigations of this topic would do well to include measures or methods in the design to specifically address this issue.

Analyzing the changes in DFM for participants viewing bodybuilders yielded a model which could be expected to account for 98% of the variance in the population. The model included time spent each week in aerobic exercise, pre-exposure anger, time spent reading non-fitness magazines, PAM and pre-exposure fatigue as factors which contributed to high DFM changes post exposure. Score on the EAT-26, time spent on resistance training and pre-exposure depression were associated with smaller DFM changes at post-exposure. Aerobic exercise and PAM were most strongly associated with increased responses while EAT score, resistance training and pre-exposure depression were the most important moderators. Aerobic exercise and PAM are highly consistent with the explanation of personal investment as key to the MANOVA results; however the

finding that resistance training again moderates changes remains difficult to interpret. It may be that for men who work out regularly, viewing images of bodybuilders may somehow accentuate feelings that they are working towards muscularity and doing "what they ought to be doing". This is, of course, a tentative explanation without direct data to support it.

For men who viewed images of normal men, a much less robust model, though still quite strong, could be expected to account for nearly 60% of the variance in the population. Time spent engaged in aerobic exercise and time spent reading non-fitness magazines were associated with increased DFM post-exposure while pre-exposure anger was linked with decreased responses. Anger was more than twice as heavily weighted in the model than the next strongest predictor. High anger at pre-exposure may have made some participants less receptive to the images and their potentially noxious effects. As in other analyses, the contribution of aerobic exercise is consistent with a fitness-oriented lifestyle and more personal investment in one's physique. The time spent reading non-fitness magazines may serve as a broad index of media exposure, and consequently the frequency with which a man is confronted with the media depictions of what a man "ought" to look like.

The regression analysis for vigor change in men who do not work out regularly and were exposed to images of normal males resulted in a model which could be expected to account for only 25% of the variance in the population. Time spent on resistance training and pre-exposure confusion were the only predictors in the model and both were associated with decreased responsiveness to the images. This regression accounted for a small amount of variance when compared with the other analyses in the

present study. This regression analysis contributed little to this study save for reiterating the power of resistance training as a moderator against noxious responses to either class of images.

Regression of depression change scores in participants who viewed images of bodybuilders resulted in a model that could be expected to account for about 92% of the variance in the population. Age at which the participant first began to workout seriously, time spent in aerobic exercise and score on the ACQ were associated with higher scores for depression post-exposure. Age, pre-exposure anger, time spent doing callisthenic exercises, times spent reading fitness magazines and time spent reading other magazines were associated with less noxious changes in depression post-exposure. Aerobic exercise, age and time engaged in calisthenics were the most potent predictors included in the model. Interestingly, calisthenics and time spent on fitness magazines both moderated depressive responses to images of bodybuilders. It may be that these were characteristic of a more informed participant about realistic expectations for muscularity in the absence of pharmacologic assistance or steroid abuse.

Regression performed on depression change in men who viewed depictions of normal men produced a model which would be expected to account for approximately 78% of the variance in the population. DFM, FFMI and pre-exposure confusion were associated with increased depression while pre-exposure tension and percent body fat moderated post-exposure depression increases. The moderator variables were weighted considerably less strongly than those contributing to increases. High DFM, FFMI and low percentage of body fat are all consistent with a high investment in fitness and also

predicted increased emotional response (depression) in men viewing the non-bodybuilder images.

Regression analyses performed on fatigue scores for men viewing bodybuilder images produced a model which could be expected to account for 43% of variance in the population. Pre-exposure vigor was associated with increased fatigue at post-exposure while age and time spent reading fitness magazines both predicted decreased fatigue. Much like for depression change scores, it may be the case that more fitness/muscularity-informed participants experienced lessened noxious effects on mood state than those who were more naïve with respect to fitness matters responded with greater mood state changes. Unfortunately, the present study did not assess fitness knowledge or level of naiveté. It is entirely possible that a man could work out 5 times per week and remain relatively uneducated with respect to fitness matters.

The final regression model included in the analysis included in the present study predicted changes in fatigue for men who viewed non-bodybuilder images. The model can be expected to account for 56% of the variance in the general population. For these men, the amount of resistance training was associated with greater fatigue post-exposure while the age at which a man first worked out seriously and score on the EAT-26 were linked to lower fatigue scores. This is the only instance where increased resistance training was found to be associated with less healthy mood states at post-exposure. Both the age of first workout and score on the EAT may both broadly conceptualized as inversely related to fitness naiveté.

Combining the results of regression analyses with the MANOVA findings yields a more sophisticated understanding of the data in the present study. Regression analyses

suggest a pattern of those men having the most personal, emotional and cognitive investment in fitness (aerobic activity, DFM, PAM, FFMI) responding to the images, especially of bodybuilders, with increased muscularity concerns and noxious changes in mood state. Bodybuilding activity such as high levels of weight training and reading fitness magazines were associated with fewer and less serious negative mood state changes after viewing both types of images. Men's responses to these images were most pronounced for muscularity concerns followed by physical effects, such as vigor and fatigue, with the fewest effects in emotional changes. This pattern is consistent with the developing literature regarding men's issues contention that men tend to channel emotion into more physiological reactions than overtly emotional ones (Baraff, 1991).

Tests of a priori hypotheses

Hypothesis I: Men who view the bodybuilder slides will exhibit negative changes in mood state, muscularity concerns and body-image post-exposure.

Hypothesis I was confirmed. Exposure to images of bodybuilders had a main effect on muscularity concerns as well as on mood state changes. PAM and DFM both increased for participants viewing these images relative to the conditions that were exposed to non-bodybuilders. Participants who saw bodybuilder images also experienced increased depression. Tension, anger and confusion increased as well but were not significantly different from participants exposed to non-bodybuilder images so it is not clear that exposure produced these mood changes. Fatigue decreased for men viewing slides of bodybuilders. In general, the changes noted in participants who viewed these images exhibited a wide range of noxious mood state changes as well increases in both subscales on the Swansea Muscularity Attitudes Questionnaire. To date there has been

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no empirical literature addressing this issue, which leaves little context in which to discuss these findings. Broadly these findings confirm the arguments made by Pope et al. (2000) in *The Adonis Complex* and establish an initial investigation in this burgeoning literature.

Hypothesis II: Men who exercise more will show more muscularity concerns than peers.

Workout status produced mixed results on the two subscales of the Swansea. PAM increased at post exposure for men who worked out, but not significantly more than it did for men who worked out less regularly. DFM actually decreased modestly at post-exposure whereas the men who worked out less regularly showed a similarly modest increase in DFM. When including the findings from analyzing the significant interaction with slide exposure it becomes clear that the decrease in DFM was largely due to those men who worked out regularly and viewed the images of normal men. This condition demonstrated a pronounced drop in DFM relative to all other conditions. The men who worked out regularly and viewed images of bodybuilders showed a modest increase in DFM at post-exposure. Likewise, the men who worked out regularly and viewed bodybuilders showed a considerable increase in PAM at post exposure while those who worked out and viewed images of normal men showed a mean increase of less than one point. This hypothesis was partially confirmed: those men who exercised regularly and viewed images of bodybuilders showed increased muscularity concerns, but those who viewed normal men responded with only modest increases in PAM and a large drop in DFM at post-exposure. The size of these responses ranged from about .15 standard deviations to about .6 standard deviations which is in line with the findings of a recent meta-analysis examining women's responses to the media ideal (Groesz, Levine &

Murnen, 2002), which found effect sizes ranging from d=-.1 to d=-.5 with an overall effect size of d=-.37. The present study provides some preliminary data that the magnitude of negative response in muscularity concerns for men is not dissimilar from the size of changes observed in body-image for women. Future replications will be important to determine the reliability of the present finding; nonetheless, the results are a clear cause for concern over men and their responses to media depictions of muscularity.

Hypothesis III: Men who perform the most exercise will show more serious eating pathology than peers.

Hypothesis III was confirmed. A one-way ANOVA revealed that men who worked out regularly endorsed significantly greater symptoms of disordered eating on the EAT-26 than men who did not work out regularly. The mean for the workout group was nearly twice that of the group that did not work out regularly. The workout mean was just under 10, which is well below the cut score suggested for clinical concern of 20. All six men who scored above the level suggested for clinical concern worked out on a regular basis. Interestingly none of the six men stood out on resistance training within the group of men who work out, but the time spent on aerobic exercise each week was considerably above the group mean for each of the six men.

Hypothesis IV: Men who spend the most time reading fitness-related magazines will show greater muscularity and body-image concerns than peers.

Bivariate correlations between time spent reading fitness magazines and these variables were all significant at the p<.01 level. Pre-exposure DFM and time spent reading fitness magazines shared 18% of their variance (r=.428). A one-way ANOVA based on those men who read fitness magazines for one hour per month or more (n=22)

versus those who read fitness magazines for less than an hour (n=43) was significant (F(1,63)=27.87, p<.001). Those men who spent more time reading fitness magazines showed more than double the level of pre-exposure DFM than men who read less than one hour per month. Pre-exposure PAM and time spent on fitness magazines shared 19% of their variance (r=.439). A one-way ANOVA on the one hour split for fitness magazines for PAM was significant (F(1,63)=24.81, p<.001). The men who spent more time reading fitness magazines showed more than four times the pre-exposure PAM of men who spent less time reading fitness magazines. Pre-exposure BSQ scores and time spent reading fitness magazines shared almost 17% of their variance (r=.408). The one-way ANOVA based on the fitness magazine split was significant (F(1,63)=24.35, p<.001). The men who read fitness magazines for less time each month scored very near the mean for "unconcerned" men on the BSQ of 55.9 (M=61.7) whereas the men who spent more time scored near the mean for "concerned" men of 109 (M=92.7) (Halpin & Fitzgerald, 1992). This indicates that time spent reading fitness magazines may serve as an important indicator of the degree to which participants are concerned about their bodies.

Summary

Generally, the pattern of findings for the present study is consistent with the *a priori* hypotheses based on the work of the pioneers of research on male body-image including Pope, Olivardia and Phillips among others. The size of effects and strengths of association found were of greater magnitude than was expected prior to conducting the study. As predicted, men generally responded with increased muscularity concerns (particularly for men who workout regularly) and noxious changes in mood state based

on exposure to images of bodybuilders. Men in the study responded most strongly with changes in muscularity concerns, followed by self-reported physical changes in fatigue and vigor followed finally by emotional changes in depression. There was a trend toward a significant increase in anger for men who worked out, which is consistent with investigations of women's responses to images of the media ideal including an investigation by Pinhas et al. (1999) which found that viewing images of the female media ideal resulted in increased depression and anger in women. It is not possible to compare the magnitude of changes in the present study with the study in women as the authors did not report effect size or group means.

Interestingly, men also responded with significant changes after viewing images of normal men with increases in depression, decreases in drive for muscularity, decreases in vigor for men who did not workout as well as increases in vigor for men who did. Closer examination reveals that the noxious changes in response to the normal images came almost exclusively from the men who worked out regularly. It seems likely that these images aroused negative responses due to participants feeling as though there was not enough difference between the men depicted in the images and their own physiques.

As predicted, the strongest responses to images of the muscular ideal came from men who worked out the most. The increased responses may be due to a higher personal investment in pursuing a fit body. Two important, unexpected results emerged: first, time spent lifting weights was associated with decreased responsiveness to exposure and secondly, time spent engaged in aerobic exercise was strongly associated with increased response to the images. It may be that resistance training represents an index of how inoculated a man is to the weightlifting subculture leading to both somewhat more

realistic expectations regarding, and habituation to images of extremely muscular men. Admittedly, women are continuously exposed to images of fashion models with empirical evidence of sensitization rather than habituation so it may well be the case that some other factor accounts for the relationship between weight training and post-exposure changes. Certainly future research to address this question would be of great value to the research literature. It was unexpected that the amount of time spent on aerobic exercise was more predictive of noxious mood state changes than time spent on weight lifting. Aerobic exercise has been identified as a significant feature of traditional eating disorders such as anorexia and bulimia nervosa. In light of the dramatically different desired end state it seemed that resistance training (weight lifting) would be more associated with changes after viewing stimuli of men with highly developed musculature. This surprising finding highlights the degree of similarity between male body-image disturbance, in the form of the Adonis Complex, and female body-image disturbances which have been well-researched.

Pope et al. (2000) argued that media portrayals of what men "ought" to look like inform men's opinions of what is reasonable and desirable much as images in the media of models and actresses inform women as to what is expected of them. Generally, men recognize that they are not expected by society to look like a competitive bodybuilder; however findings by multiple research teams (Tantleff-Dunn & Thompson, 1995; Jacobi & Cash, 1994; Fallon & Rozin, 1985) have determined that men overestimate the amount of musculature women find desirable by more than 20 pounds. To put this number in context, a change of twenty pounds of muscle on a man who is 5"11' and 195 lbs and 18% body fat would result in his FFMI going from a noticeably muscular 23.9 up to 27.5

which is well beyond the natural limit of approximately 26 that a lean, gifted bodybuilder can hope to achieve without using steroids. Viewing images like those used in this study clearly arouse an increased desire to be muscular and increase the positive characteristics believed to accompany muscularity. They also arouse negative changes in mood state presumably due to feelings of not "measuring up" to society's standards for men; even if those standards are considerably smaller than the men depicted.

Feelings of not living up to society's standards play a fundamental role in muscle dysmorphia and the Adonis Complex in general. In a very real sense, competitive bodybuilders are a standard every bit as unattainable as airbrushed photographs of fashion models with cinched waists. The abuse of steroids allows men to grow well beyond the natural limits of the human body, literally becoming a caricature of muscularity. The lengths to which serious bodybuilders will disrupt their lives in pursuit of muscularity have been well documented (Fussell, 1991; Klein, 1993), but fall outside the scope of the current project. This disruption and distress shares much in common with the suffering associated with traditional eating disorders.

The health complications of muscle dysmorphia can be just as serious as for traditional eating disorders and body-image disturbances. Over-training of the muscles can lead to serious workout-related injuries to the musculoskeletal system. Frequently, serious weight lifters do not allow adequate time for recovery from such injuries leading to re-injuries and even crippling conditions that impair the daily activities of living (Pope et al., 2000). The anabolic steroids that serious weightlifters sometimes turn to carry very serious health consequences including infertility, testicular atrophy, male pattern baldness, breast growth (gynemastecemia), tendon ruptures, enlargement of the heart's

left ventricle, liver cancer, liver failure, prostate cancer, homicidal rage, psychosis and heart attack (NIDA, 2004). Further, as steroids are a controlled substance, men frequently must obtain them illegally. The overwhelming majority of abused anabolic steroids are injected substances, which lead to all of the same difficulties with obtaining clean needles that heroin abusers encounter. While serious weightlifters often find ways around this problem, there have been documented increases in infection and HIV in men who abuse anabolic steroids presumably due to re-using and/or sharing needles (NIDA, 2004).

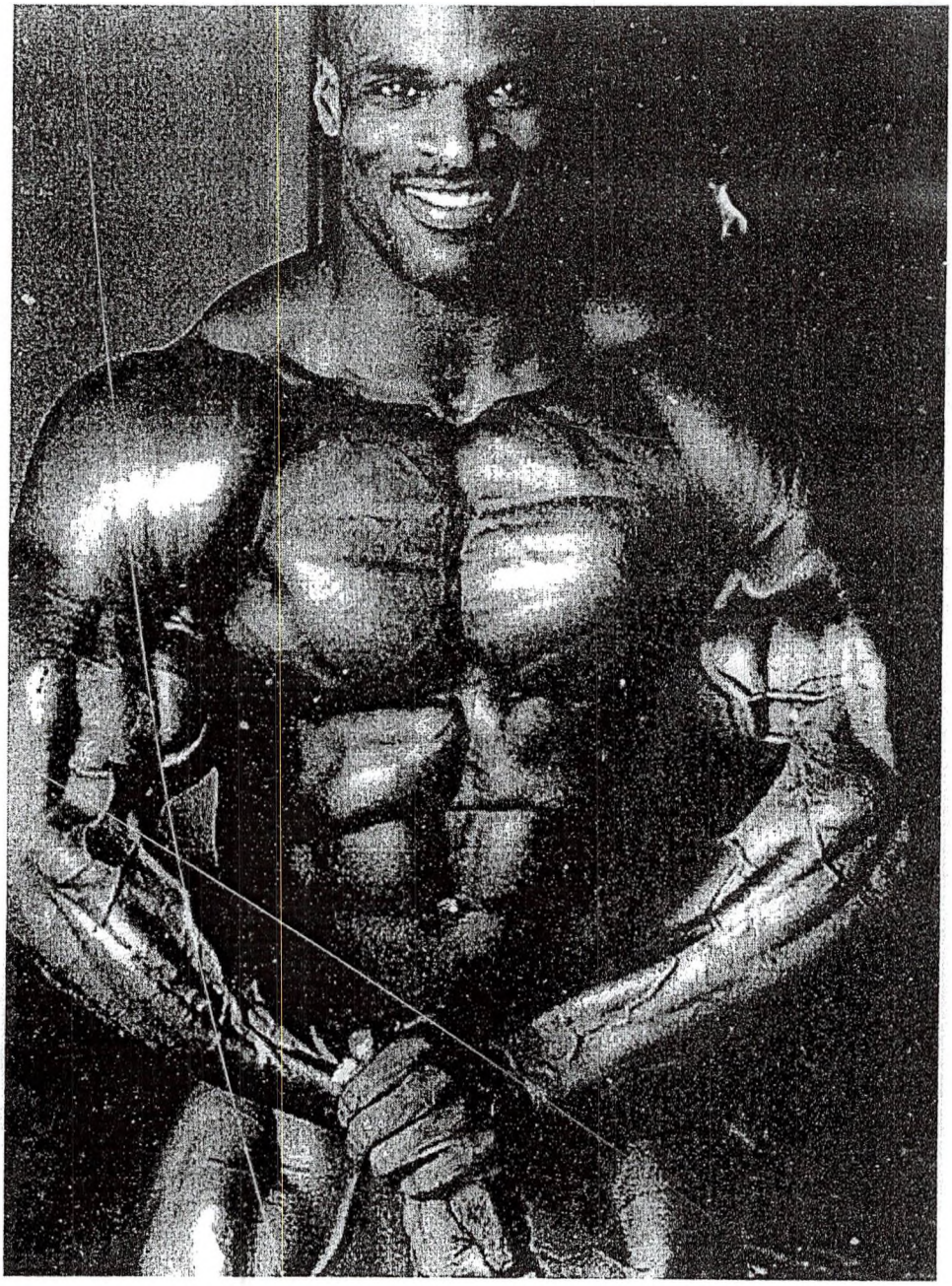
The serious health consequences suffered by men experiencing muscle dysmorphia highlight the importance of the burgeoning literature on male body image disturbance. Considerable future research is needed in this area. From the present study it is clear that the varying roles of aerobic and anaerobic exercise should be further investigated. Future research in this area should include a check for knowledge specific to the weightlifting/bodybuilding subculture as an index of subject naiveté. Interviews and focus groups addressing what it feels like to view images like those included in this study could provide very useful qualitative data in this area. Future research in this area should include a stricter delineation of groups. In the present study working out regularly was operationally defined as engaging in activities primarily intended to improve fitness no less than three times per week. This criterion led to men who work out very regularly twice a week to be included in the non-workout sample. Future research should use a control group of men who do not work out at all on a regular basis to improve the richness of comparison conditions. Future investigations should be conducted in different settings and with much larger sample sizes to determine the generalizability of

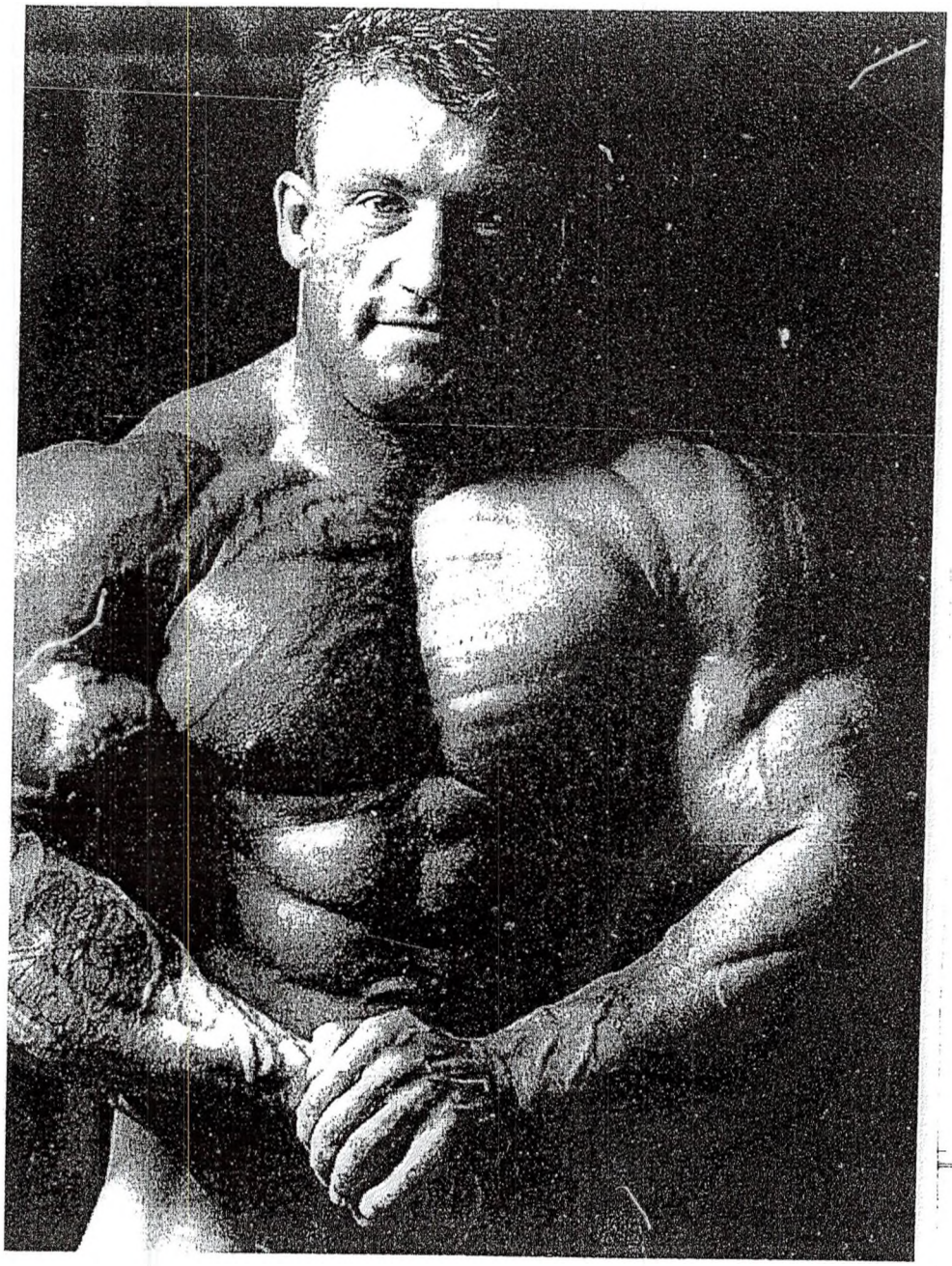
these results. Future investigations will also be required to begin to account for the phenomena of female bodybuilders. There has been virtually no literature examining the factors leading to women becoming bodybuilders, though there has been some research looking at body-image and general psychopathology in that population. Further study will be required to determine how female bodybuilders may figure into Pope et al.'s work on muscle dysmorphia or whether the theory may need to be altered to account for them.

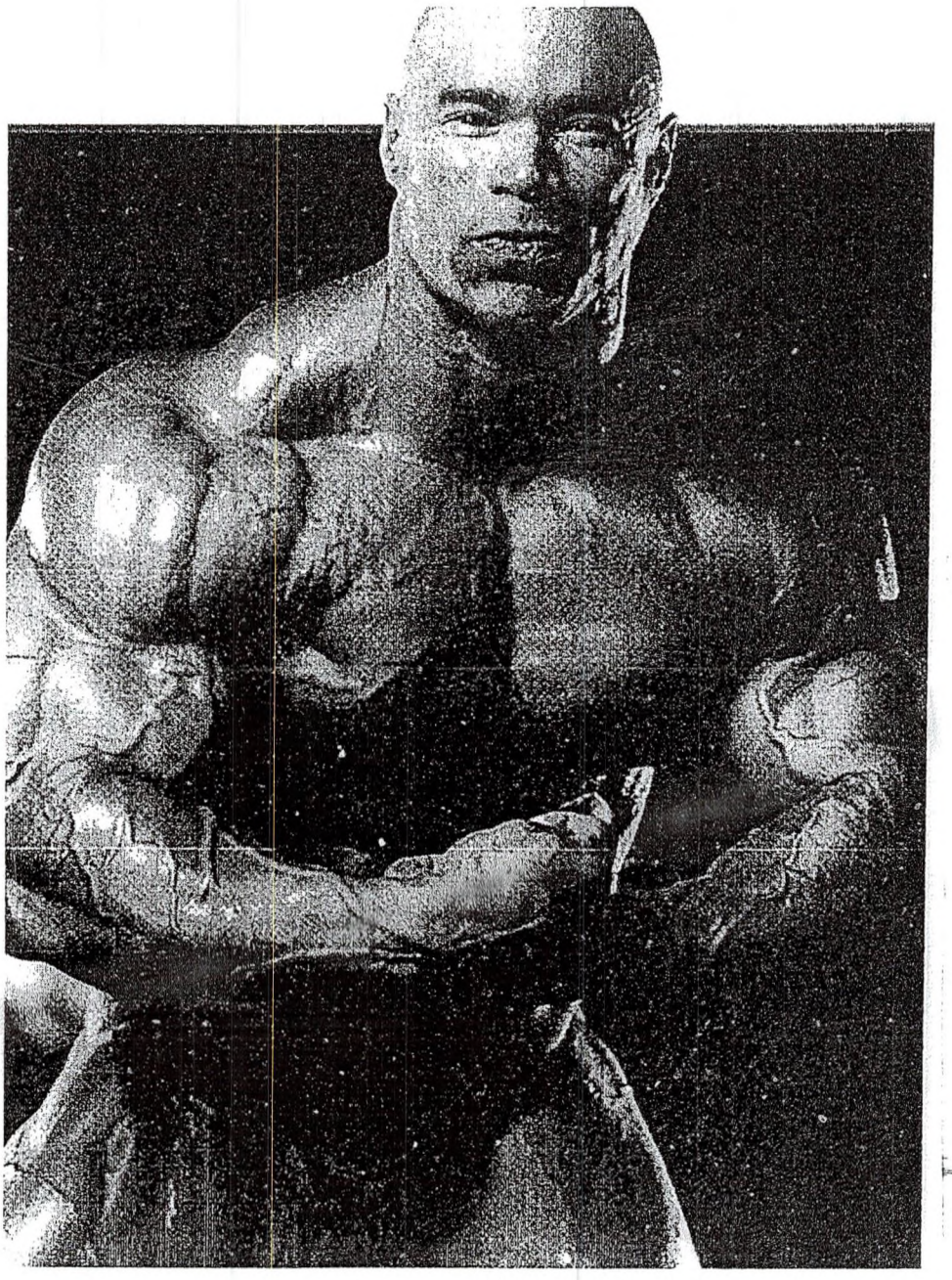
This study is an important first step in understanding the responses of men to viewing depictions of the male muscular ideal. These important findings will need to be replicated before great confidence can be placed in them, however they do provide a tentative, initial understanding of the dynamics important to men's responses to the pervasive images of glistening muscular men. As the trends towards increased fitness in our society and the increased use of muscular men in advertising a wide array of products entirely unrelated fitness or working out (Pope et al., 2000) progresses, men will be bombarded with an increasing number of images like those used in the present investigation. These trends will render the findings of this initial investigation that much more relevant and important in coming years.

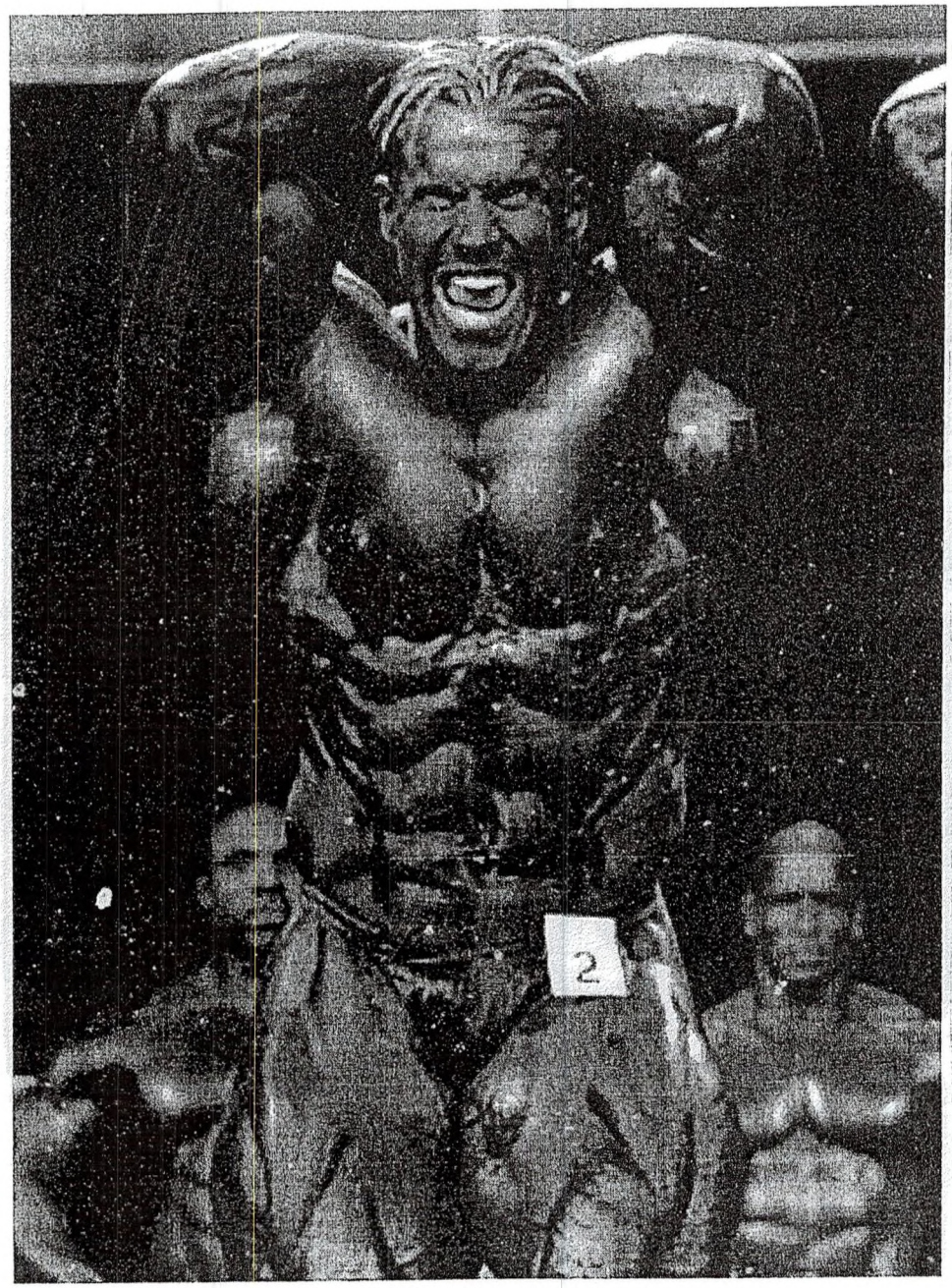
APPENDIX A

EXPERIMENTAL IMAGES





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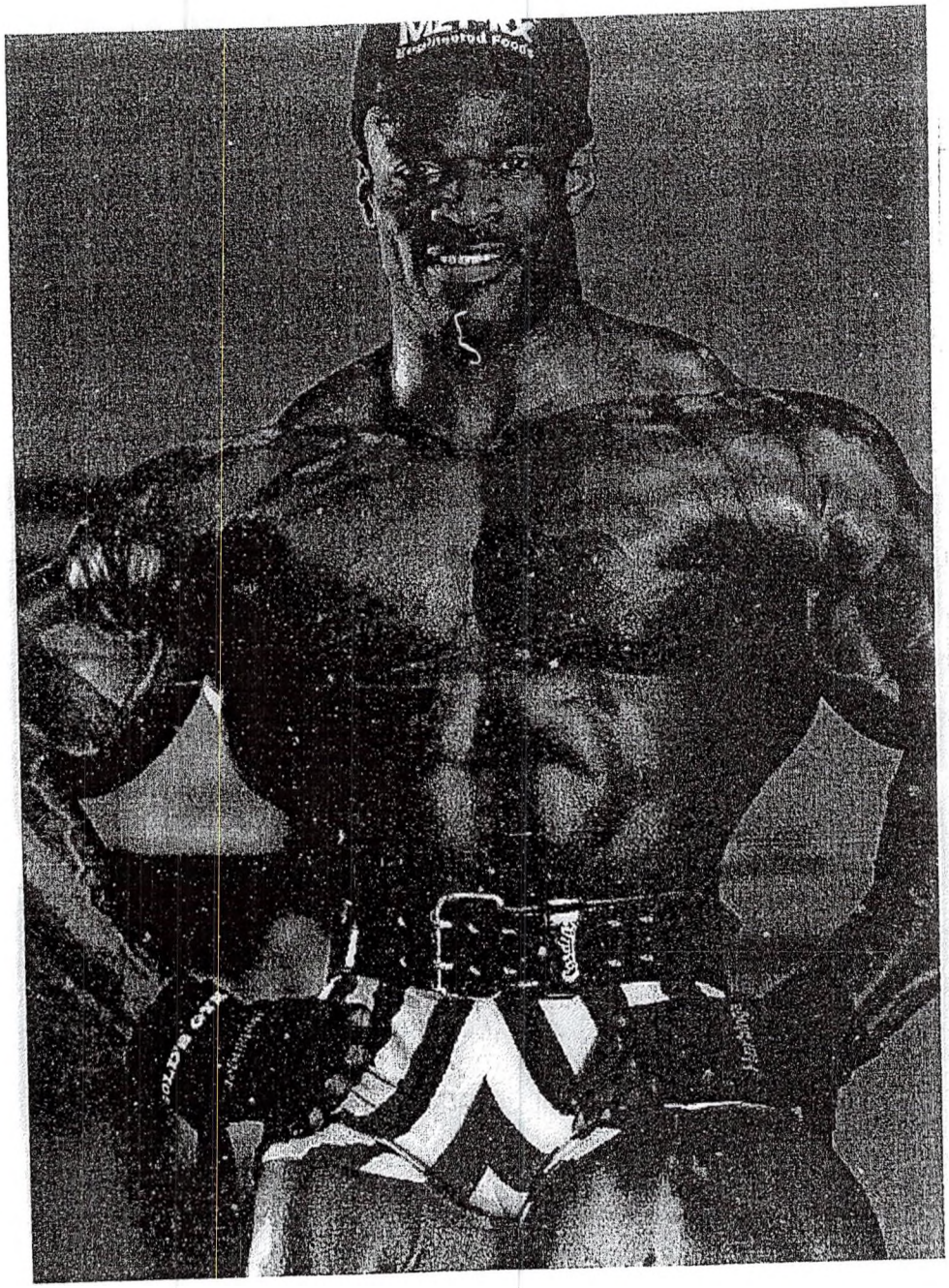

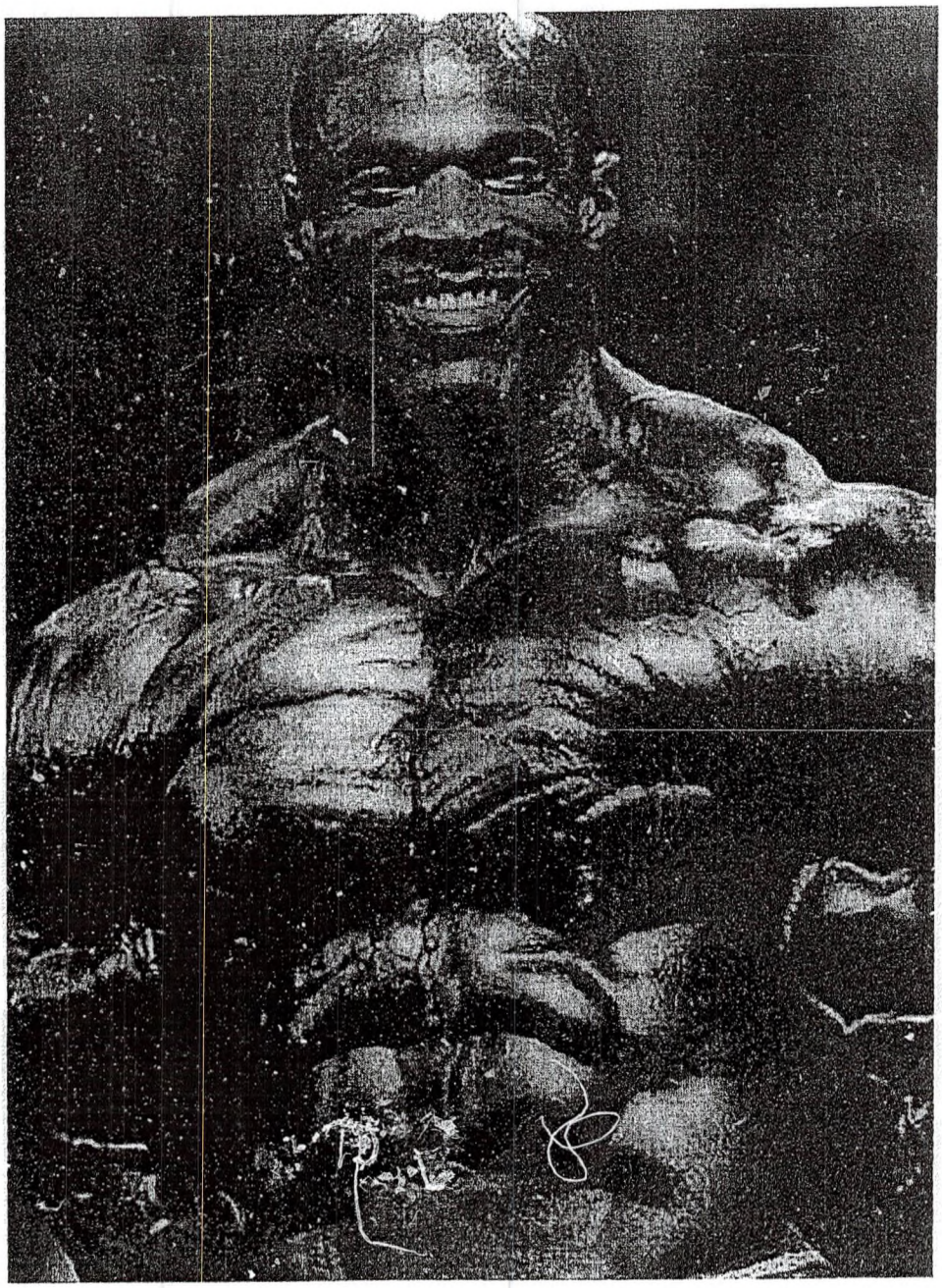

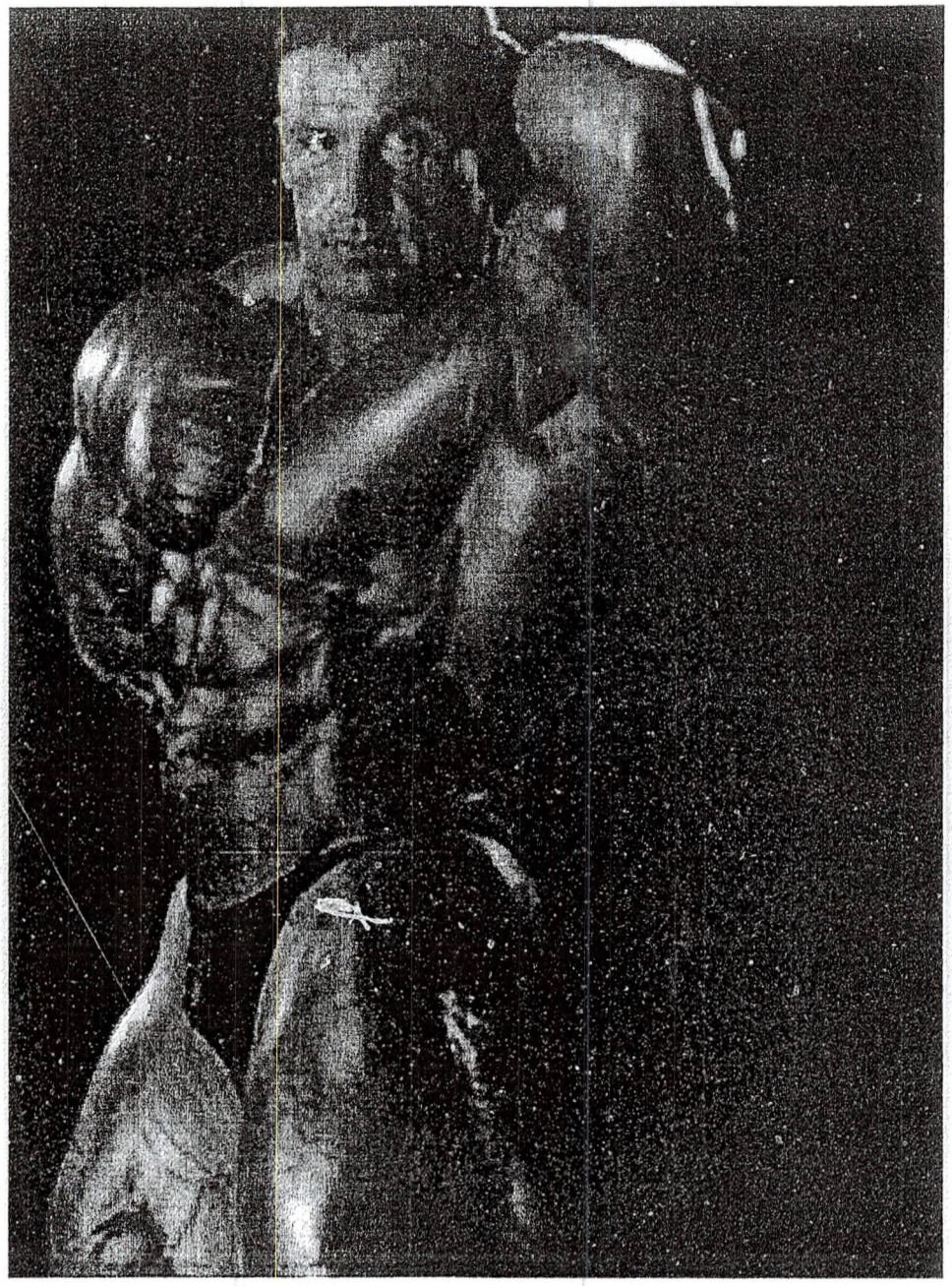

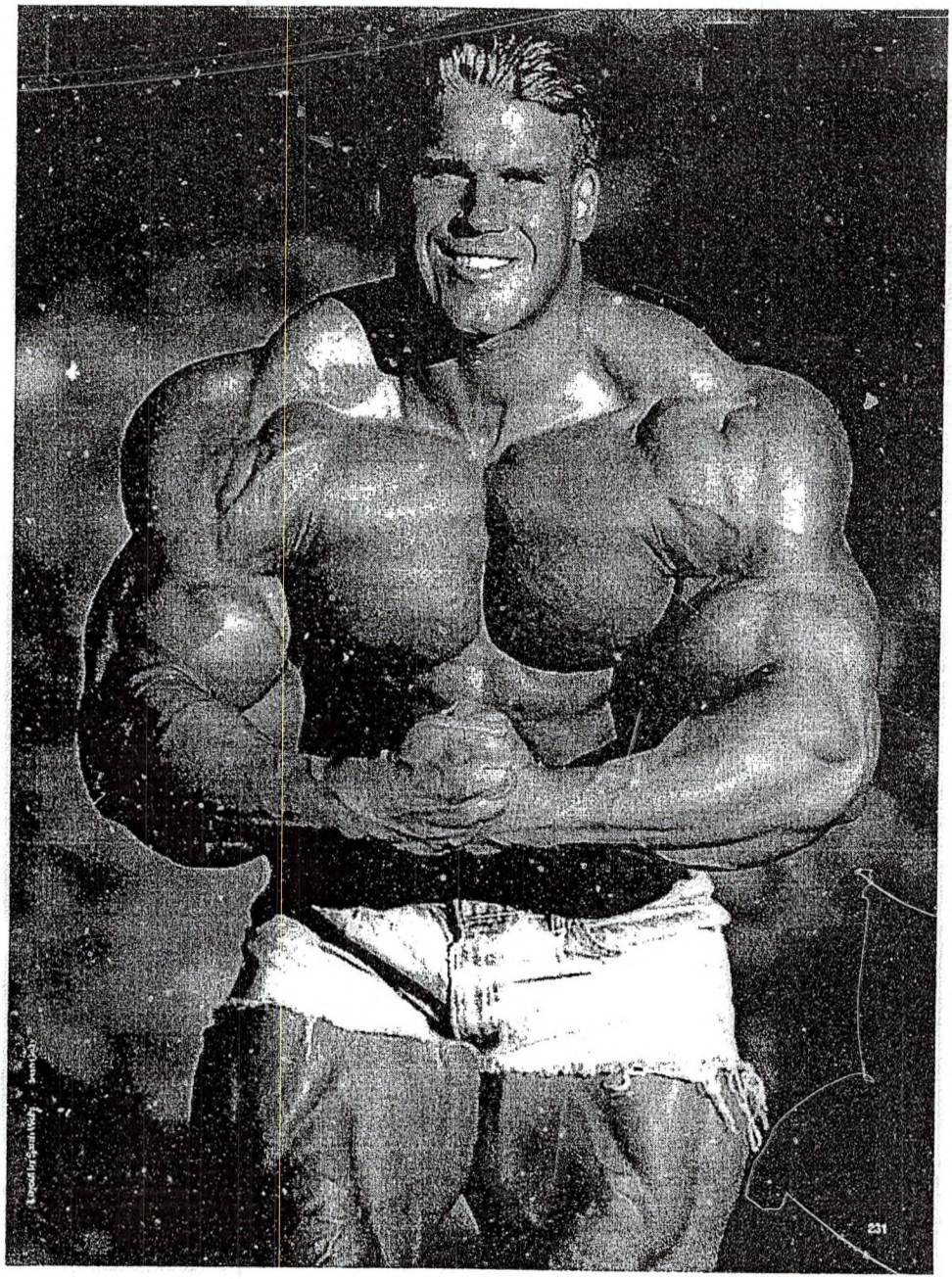

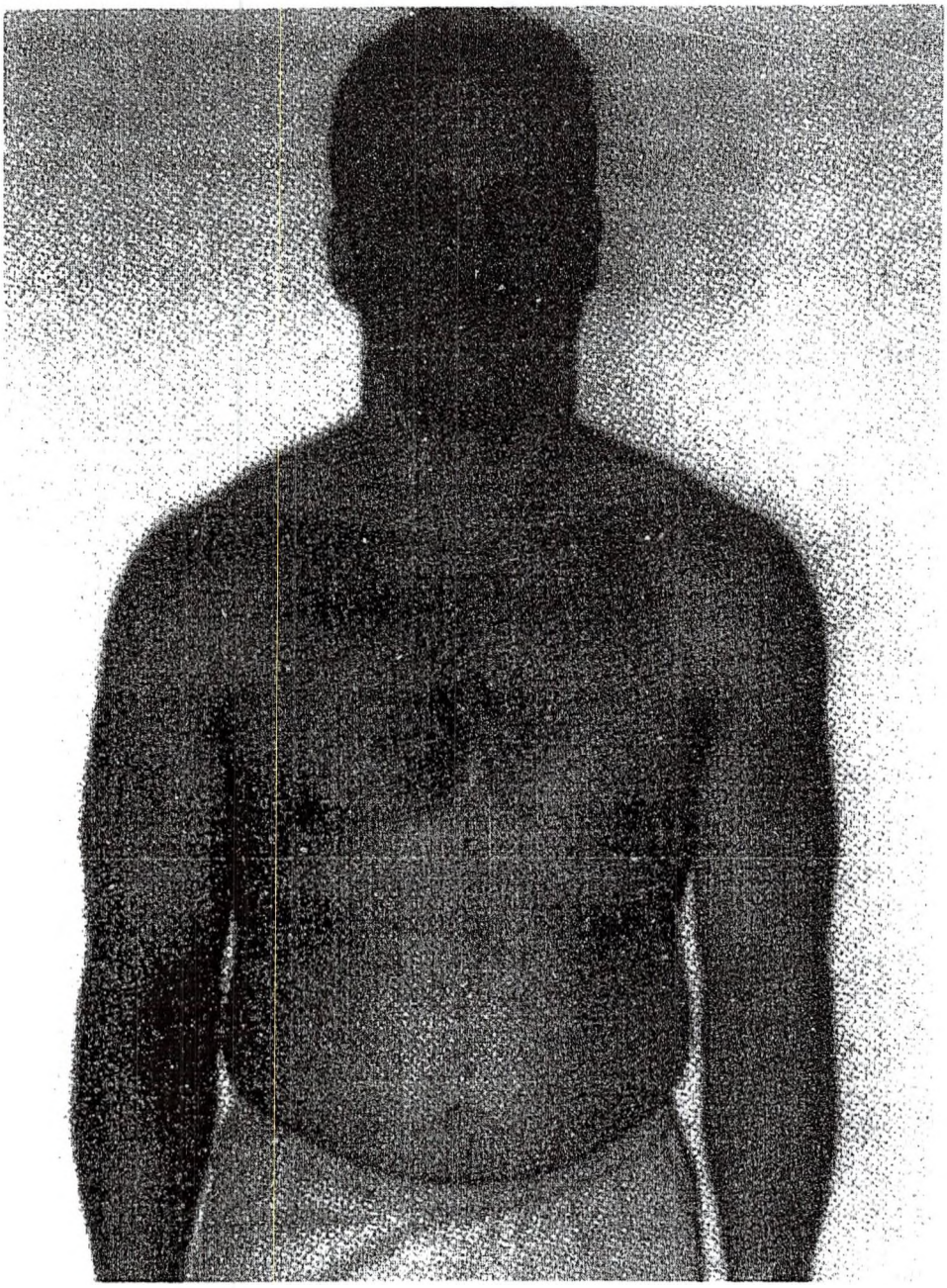

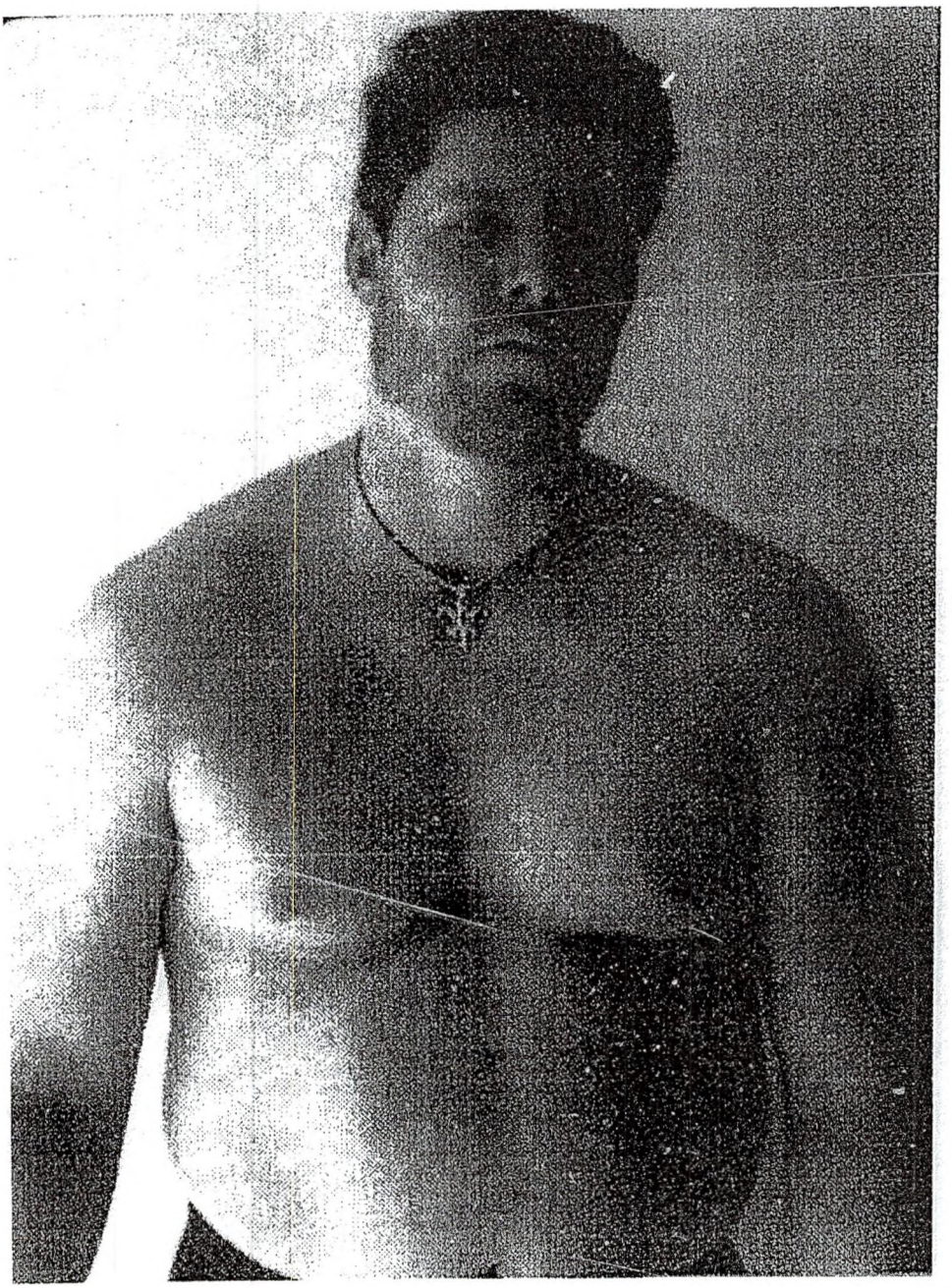

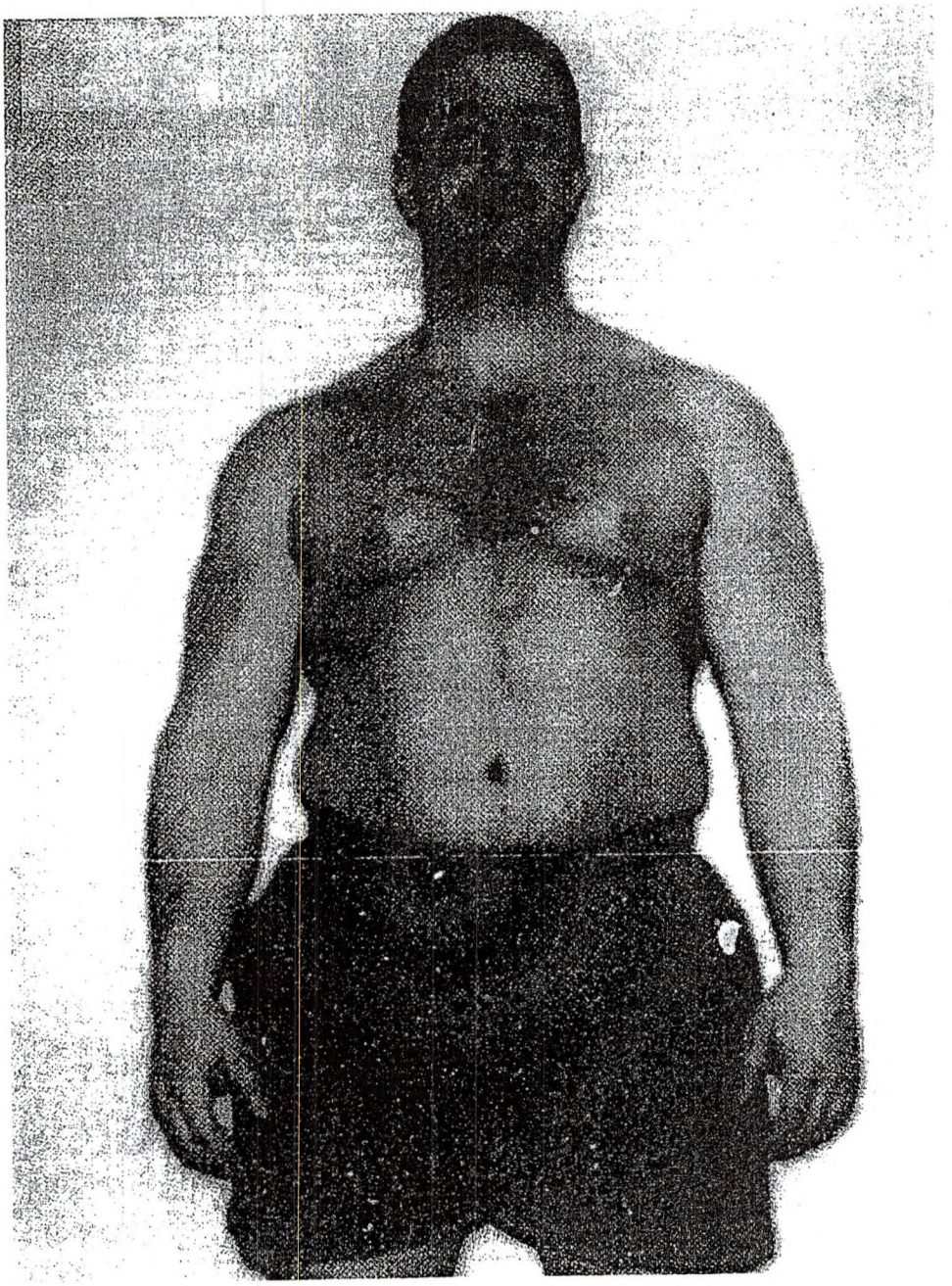

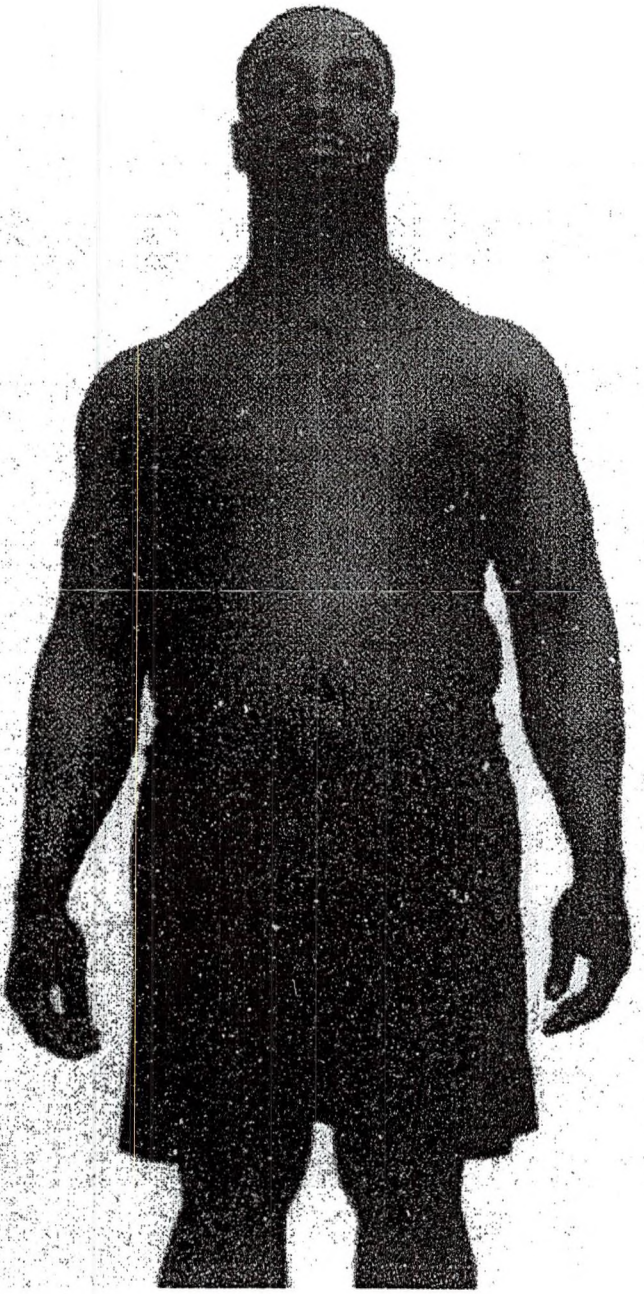

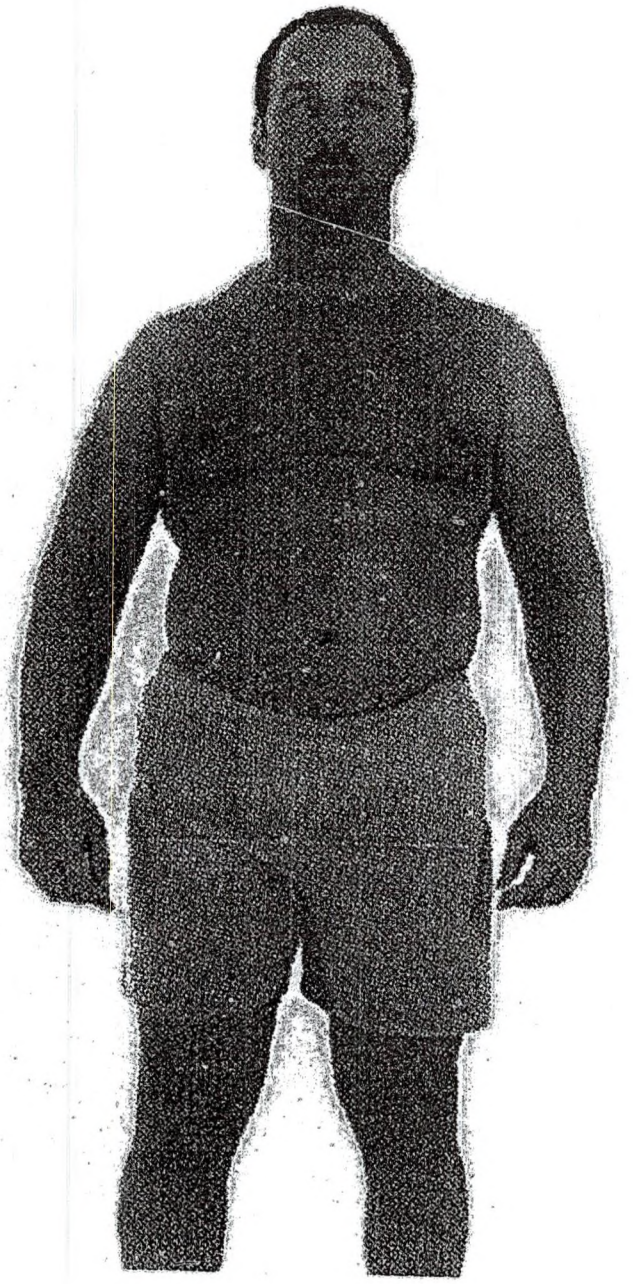

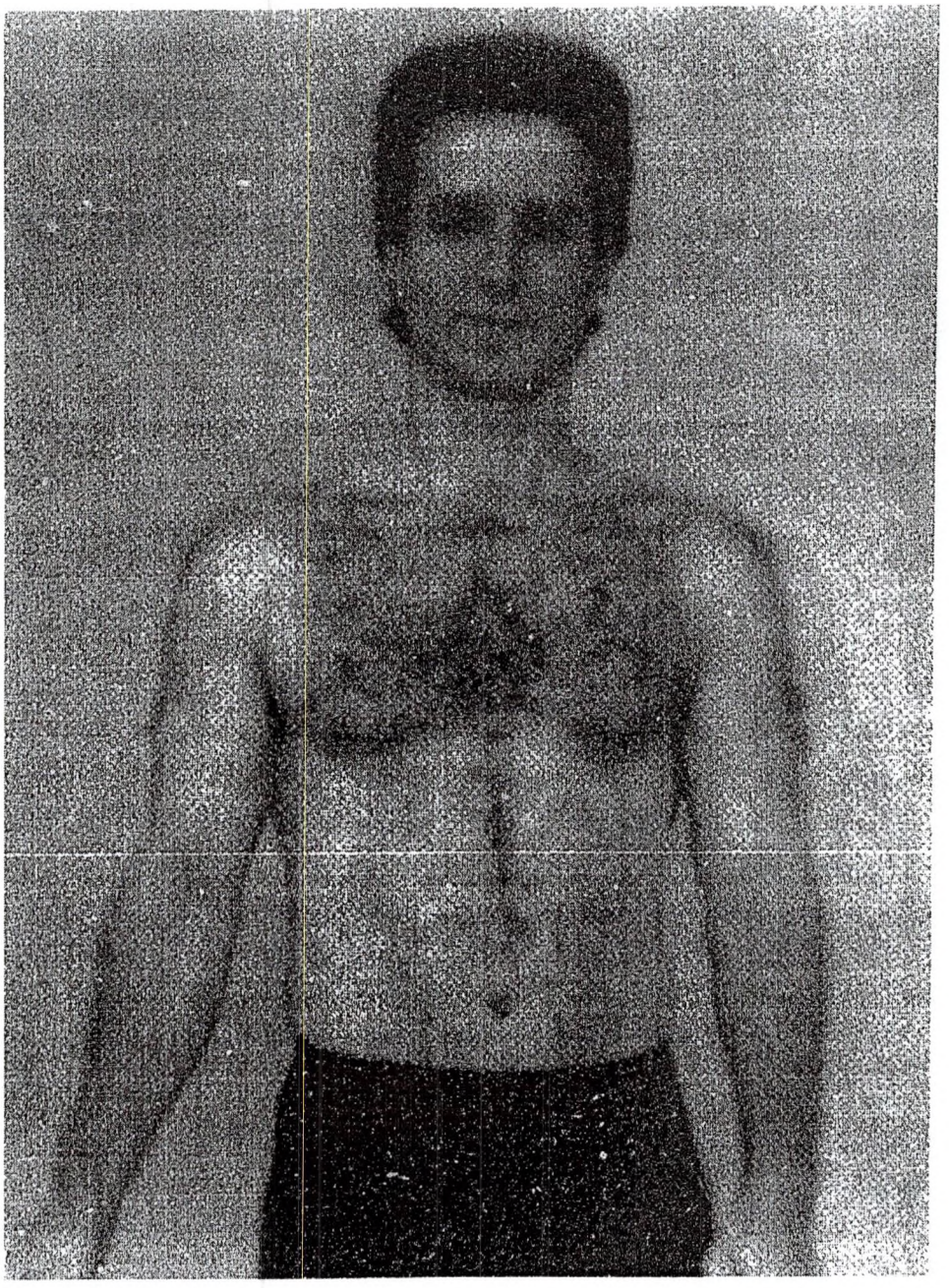

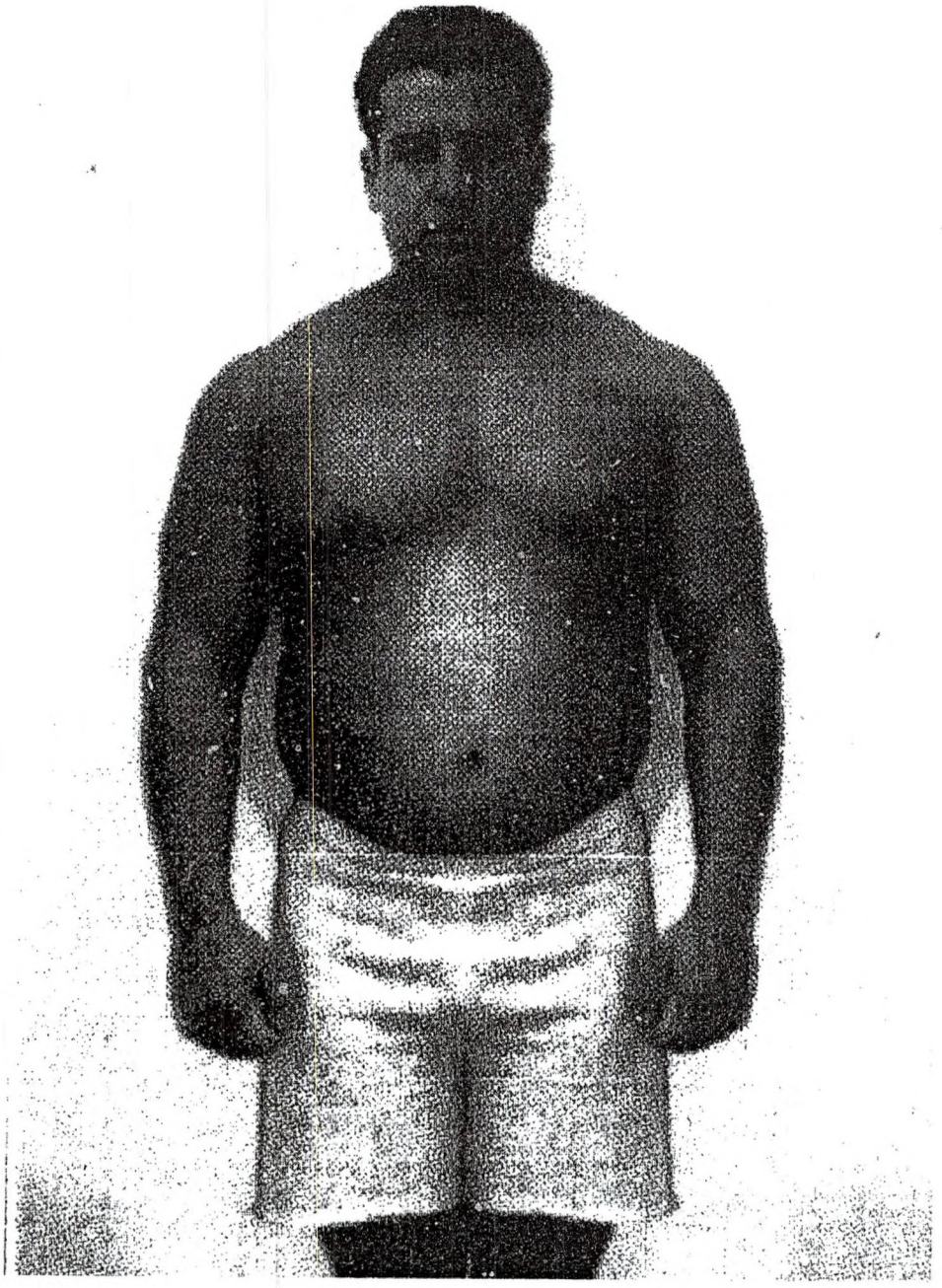

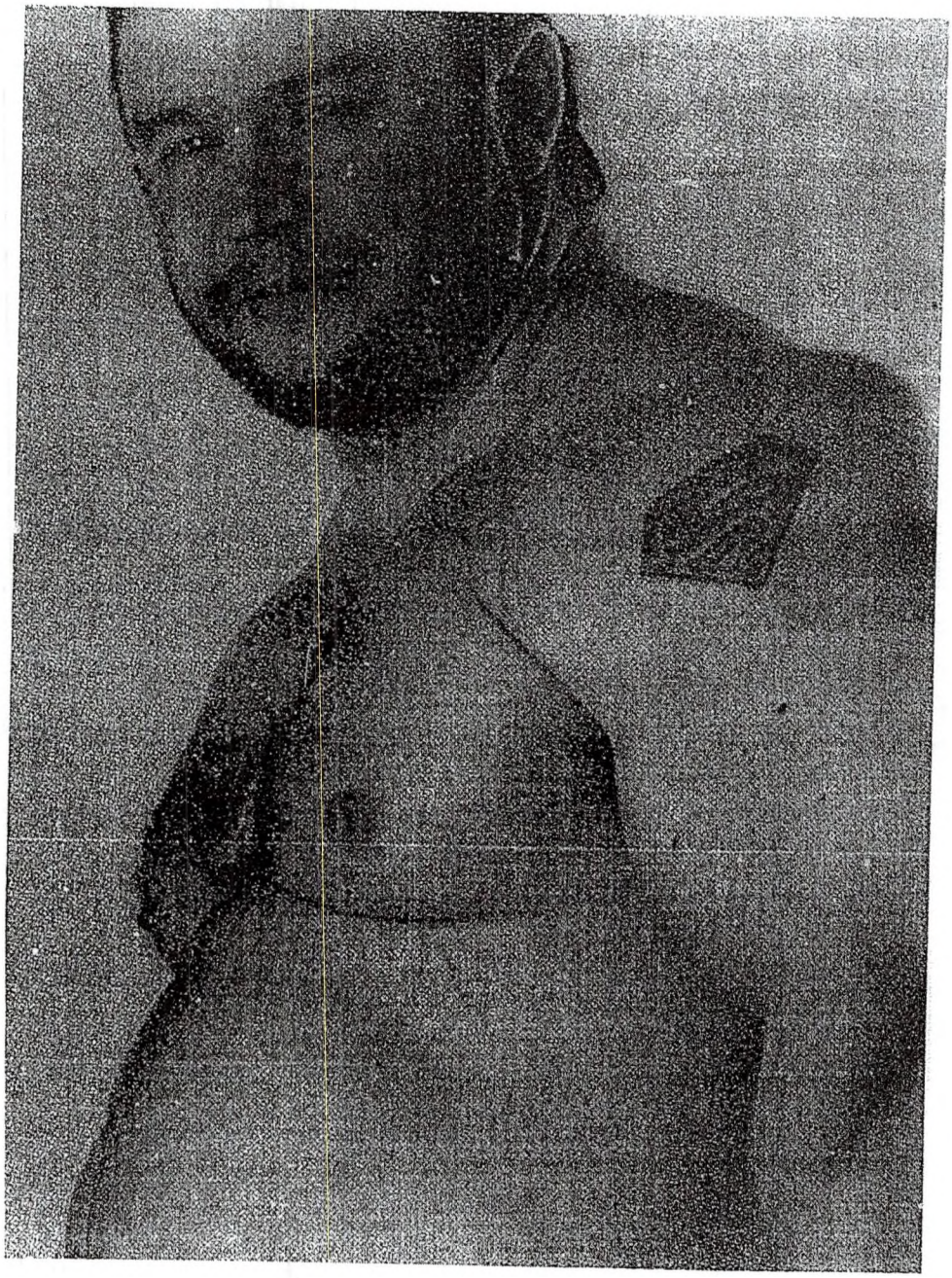

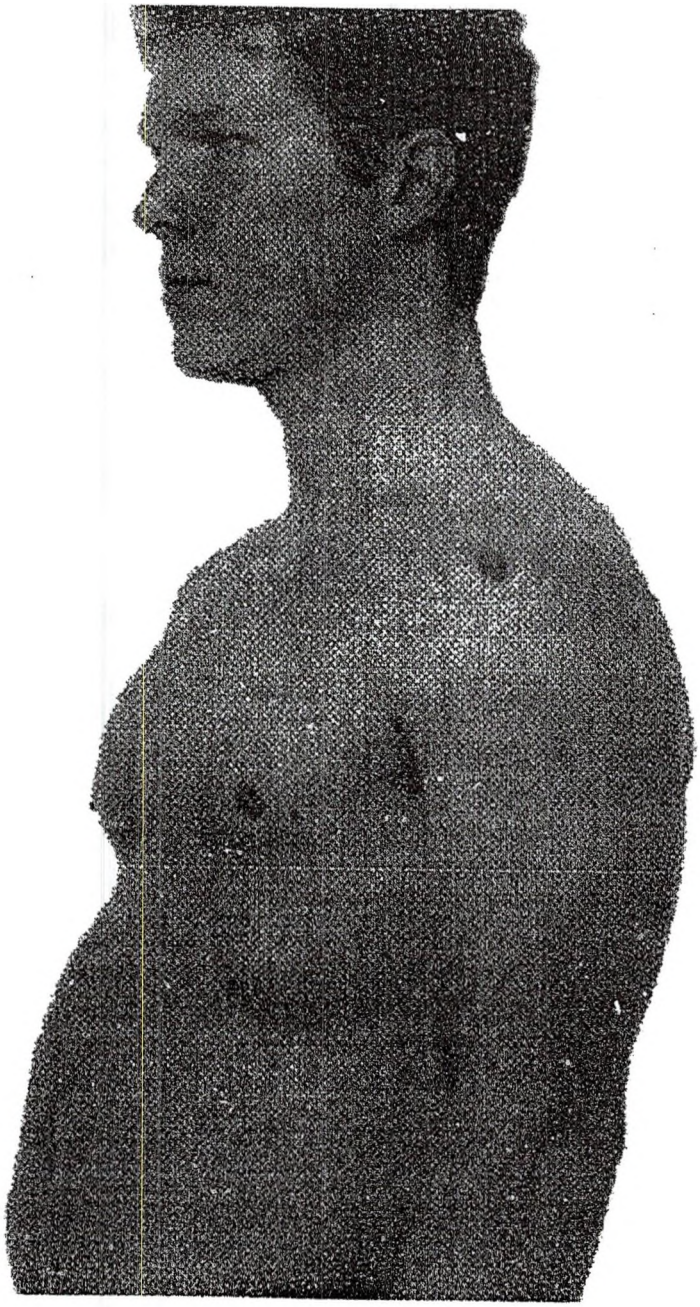

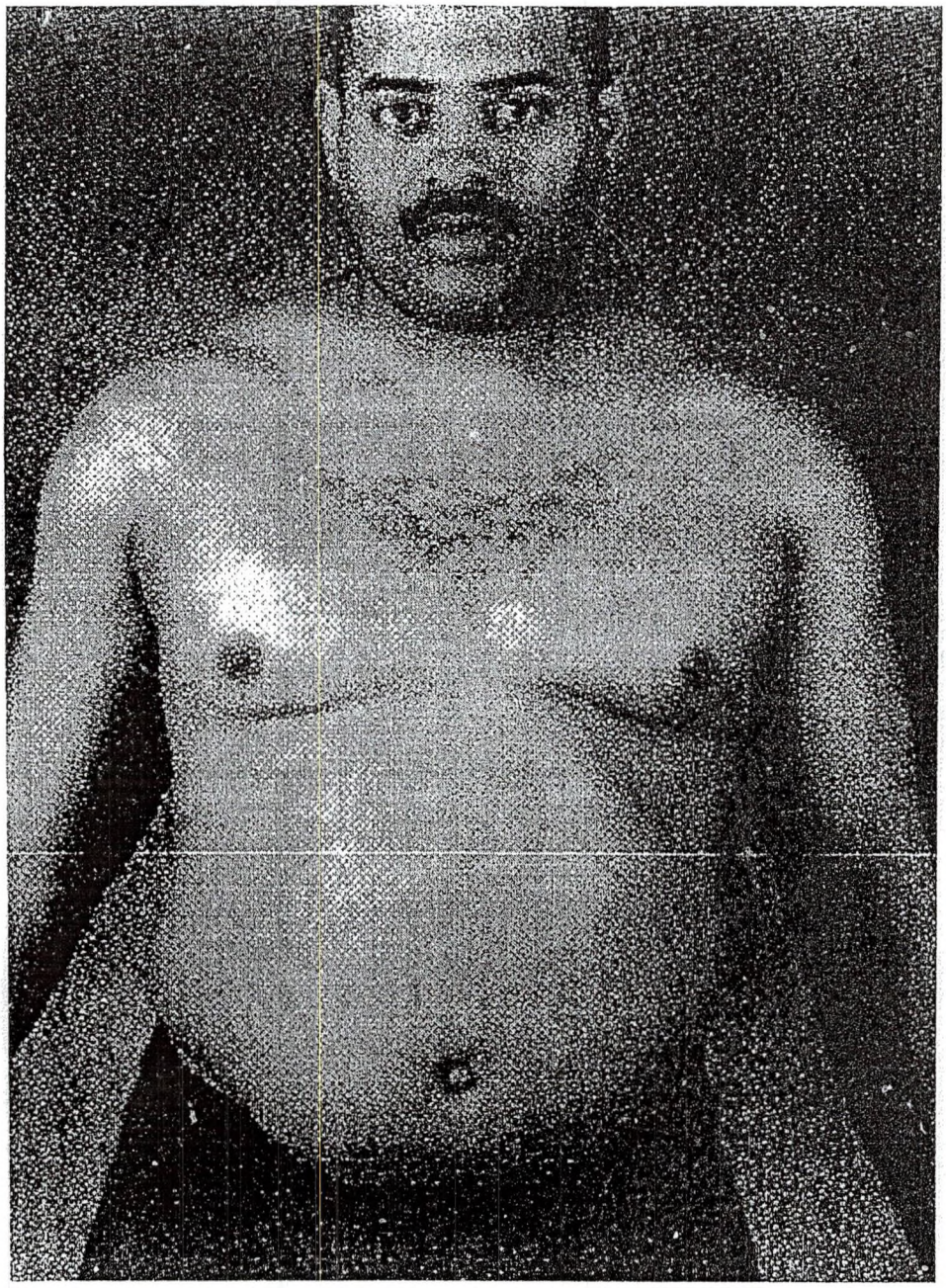

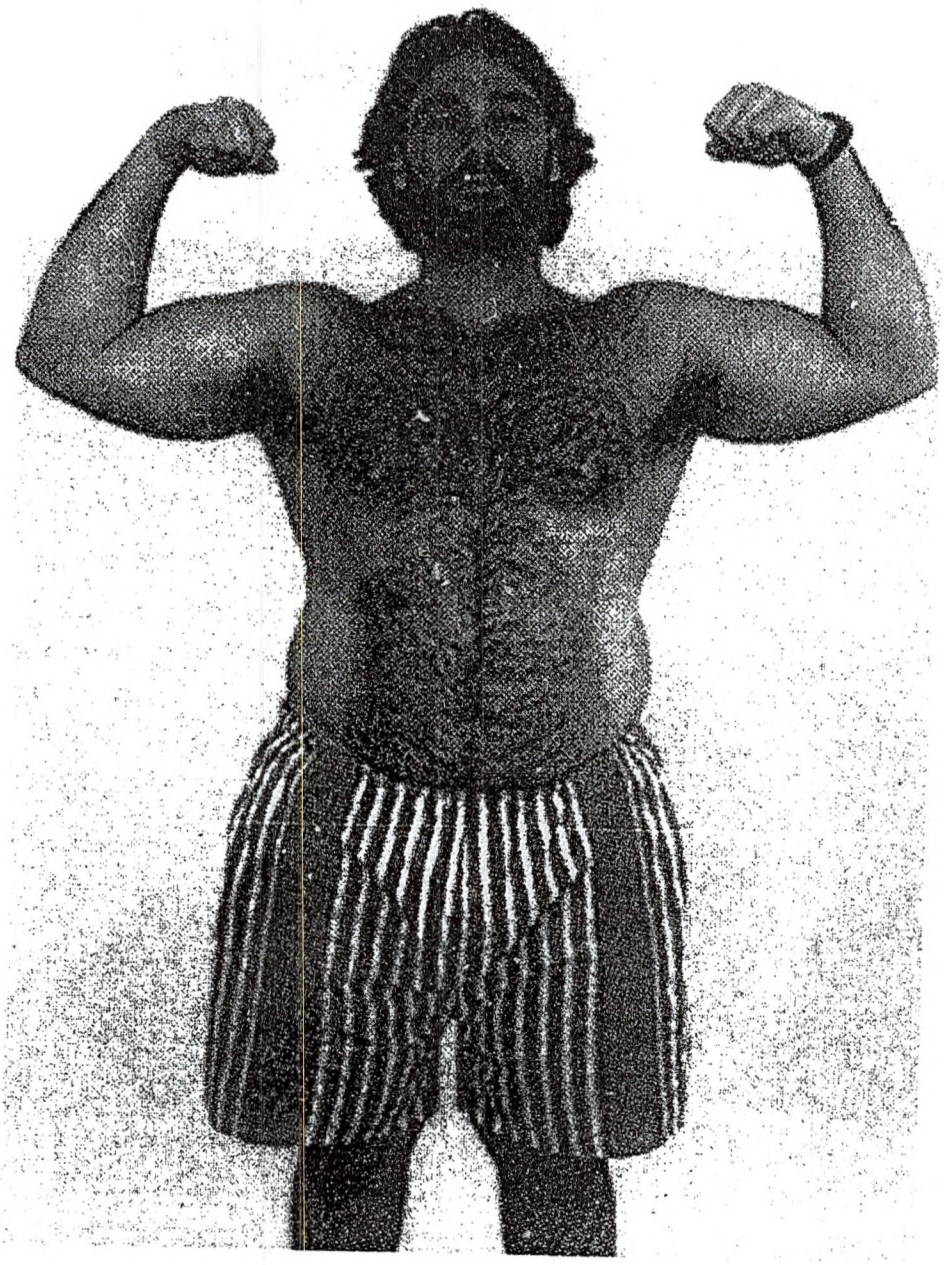

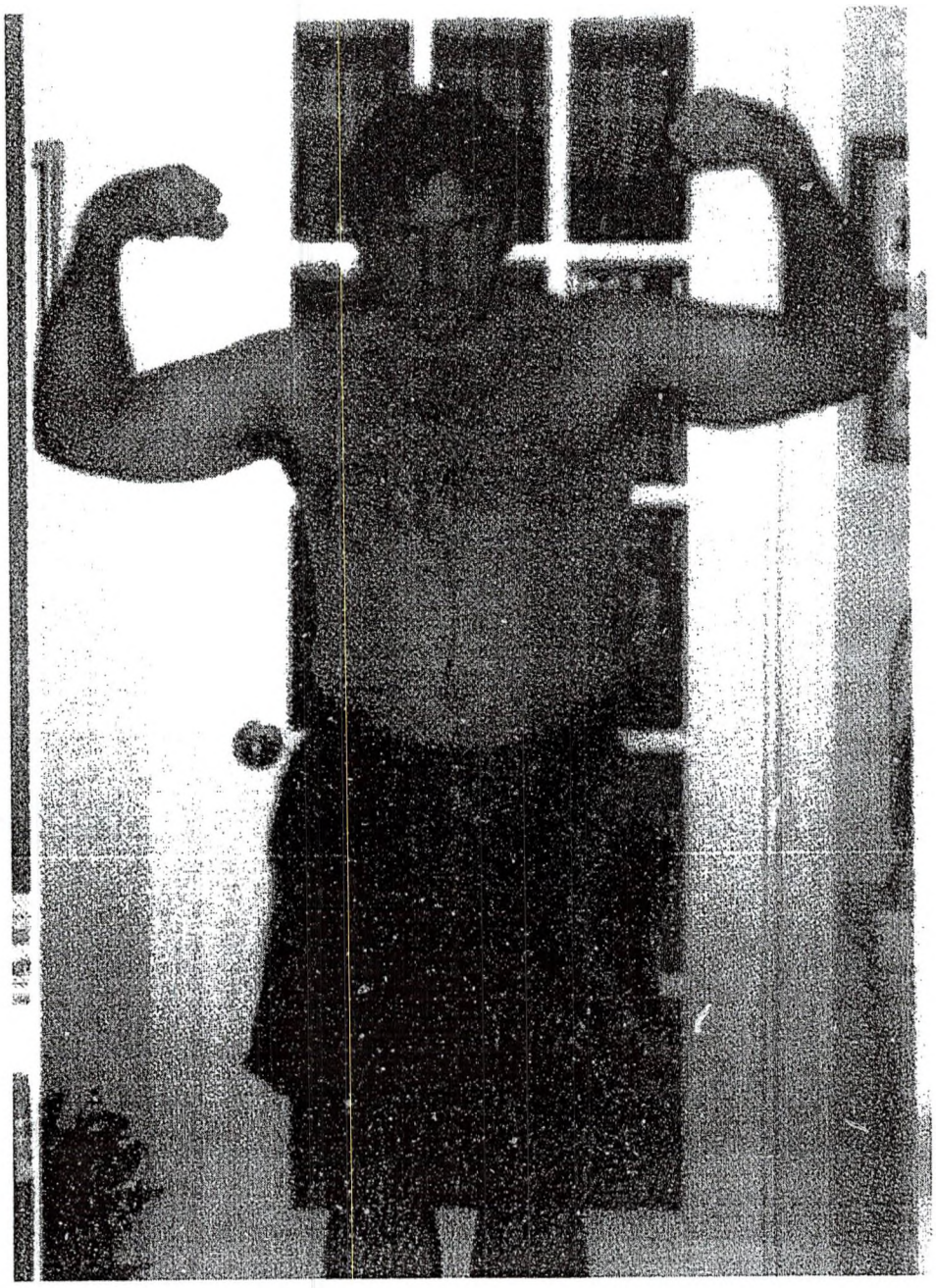

APPENDIX B

Eating Attitudes Test –26

For each item please rate the extent to which each statement applies to you utilizing the following scale.

1 = definitely
2 = strongly agree
3 = agree
4 = neutral
5 = disagree
6 = strongly disagree
7 = definitely not

1. I am terrified about being overweight _____
2. Avoid eating when I am hungry _____
3. I find myself preoccupied with food _____
4. Have gone on binges where I feel that I may not be able to stop _____
5. Cut my food into small pieces _____
6. Aware of the calorie content of foods that I eat _____
7. Particularly avoid foods with a high carbohydrate count _____
8. Feel that others would prefer if I ate more _____
9. Vomit after I have eaten _____
10. Feel extremely guilty after eating _____
11. Am preoccupied with a desire to be thinner _____
12. Think about burning up calories when I exercise _____
13. Other people think that I am too thin _____
14. Am preoccupied with the thought of having fat on my body _____
15. Take longer than others to eat meals _____
16. Avoid foods with sugar in them _____
17. Eat diet foods _____
18. Feel that food controls my life _____
19. Display self-control around food _____
20. Feel that others pressure me to eat _____
21. Give too much time and thought to food _____
22. Feel uncomfortable after eating sweets _____
23. Engage I dieting behavior _____
24. Like my stomach to be empty _____
25. Enjoy trying new rich foods _____
26. Have the impulse to vomit after meals _____

APPENDIX C

BSQ

We would like to know how you have been feeling about your appearance over the PAST FOUR WEEKS. Please read each question and circle the appropriate number to the right. Please answer all questions.

	Never	Rarely	Some-times	Often	Very Often	Always
1. Has feeling bored made you brood about your shape?	1	2	3	4	5	6
2. Have you been so worried about your shape that you have been feeling you ought to diet or workout?	1	2	3	4	5	6
3. Have you thought that your chest thighs, hips or bottom are too large or too small for the for the rest of your body?	1	2	3	4	5	6
4. Have you been afraid that you might become fat (or fatter)?	1	2	3	4	5	6
5. Have you worried about your flesh not being firm enough?	1	2	3	4	5	6
6. Has feeling full (e.g., after eating a large meal) made you feel fat?	1	2	3	4	5	6
7. Have you felt so bad about your shape that you have cried?	1	2	3	4	5	6
8. Have you avoided running because your flesh might wobble?	1	2	3	4	5	6
9. Has being with muscular men made you feel self-conscious about your body?	1	2	3	4	5	6

	Never	Rarely	Some-times	Often	Very Often	Always
10. Have you worried about your thighs spreading out when sitting down?	1	2	3	4	5	6
11. Has eating even a small amount of food made you feel fat?	1	2	3	4	5	6
12. Have you noticed the shape of other men and felt that your own shape compared unfavorably?	1	2	3	4	5	6
13. Has thinking about your shape interfered with your ability to concentrate (e.g. while watching television, reading, listening to conversations)?	1	2	3	4	5	6
14. Has being naked, such as when taking a bath, made you feel fat?	1	2	3	4	5	6
15. Have you avoided wearing clothes which make you particularly aware of the shape of your body?	1	2	3	4	5	6
16. Have you imaged cutting off fleshy areas of your body?	1	2	3	4	5	6
17. Has eating sweets, cakes or other high calorie foods made you feel fat?	1	2	3	4	5	6
18. Have you not gone out to social (e.g. parties) because you have felt bad about your shape?	1	2	3	4	5	6
19. Have you felt excessively large and rounded?	1	2	3	4	5	6
20. Have you felt ashamed of your body?	1	2	3	4	5	6
21. Has worry about your shape made you diet or workout?	1	2	3	4	5	6

	Never	Rarely	Some-times	Often	Very Often	Always
22. Have you felt happiest about your shape when your stomach has been empty (e.g. first thing in the morning)?	1	2	3	4	5	6
23. Have you thought that you are the shape you are because you lack self-control?	1	2	3	4	5	6
24. Have you worried about other people seeing rolls of flesh around your waist or stomach?	1	2	3	4	5	6
25. Have you felt that it is not fair that other men are more muscular or leaner than you?	1	2	3	4	5	6
26. Have you vomited in order to feel leaner?	1	2	3	4	5	6
27. When in company have you worried about taking up too much or too little space (e.g. sitting on a couch or bench)	1	2	3	4	5	6
28. Have you worried about your flesh being dimply?	1	2	3	4	5	6
29. Has seeing your reflection (e.g. in a mirror or shop window) made you feel bad about your shape?	1	2	3	4	5	6
30. Have you pinched areas of your body to see how much fat is there?	1	2	3	4	5	6
31. Have you avoided situations where people could see your body (e.g. communal changing rooms or swimming pools?	1	2	3	4	5	6
32. Have you taken laxatives in order to feel leaner?	1	2	3	4	5	6

33. Have you been particularly self-conscious about your shape in the company of other people?	1	2	3	4	5	6
34. Has worry about your shape made you feel your ought to exercise?	1	2	3	4	5	6

APPENDIX D

Swansea Muscularity Attitudes Questionnaire

For each item please indicate the extent the statement applies to you utilizing the following scale.

1 = definitely
2 = strongly agree
3 = agree
4 = neutral
5 = disagree
6 = strongly disagree
7 = definitely not

___ 1. I feel that I am less attractive to prospective partners when I have small muscles than when I have larger muscles.
___ 2. I would like to be bigger in the future.
___ 3. Men with small muscles are less masculine than men with larger muscles.
___ 4. I am to further develop my physique.
___ 5. I would like to be more muscular in the future.
___ 6. I feel bad about my body when I do not feel very big or muscular
___ 7. I would like to spend more time building up my muscles.
___ 8. I think big muscles are a sign of masculinity.
___ 9. I often engage in bodybuilding.
___ 10. I feel more masculine when I am more muscular
___ 11. I intend to become more muscular in the future.
___ 12. Being larger, stronger-looking and more muscular makes men more attractive to perspective partners.
___ 13. I want to be more muscular than I am now.
___ 14. I often engage in activities that build up my muscles.
___ 15. I feel like less of a man when I have small muscles than when I have large muscles.
___ 16. It is important to me that I should be more rather than less muscular.
___ 17. Being muscular gives me confidence.
___ 18. I feel that when I have small muscles I do not look as good as when I have large muscles.
___ 19. I would prefer to be more rather than less muscular.
___ 20. I feel more of a mature man when I have large muscles.

APPENDIX E

Adonis Complex Questionnaire

1. How much time do you spend each day worrying about some aspect of your appearance (not just thinking about it, but actually worrying about it)?
    a) less than 30 minutes
    b) 30-60 minutes
    c) more than 60 minutes

2. How often are you distressed by your appearance concerns (that is, feeling upset, anxious or depressed)?
    a) rarely or not at all
    b) sometimes
    c) frequently

3. How often do you avoid having part of your body seen by others? For example, how often do you avoid locker rooms, swimming pools or situations where you have to take off your clothes? Alternatively, how often do you wear certain clothes to alter or disguise your body appearance – such as a hat to hide your hair or baggy clothes to hide your body
    a) rarely or not at all
    b) sometimes
    c) frequently

4. How much total time do you spend each day involved in grooming activities to improve your appearance?
    a) less than 30 minutes
    b) 30-60 minutes
    c) more than 60 minutes

5. How much total time do you spend each day on physical activities to improve your body appearance, such as lifting weights, doing sit-ups or running on a treadmill? (Include only those sports activities in which one of your major goals is to improve your appearance.)
    a) less than 60 minutes
    b) 60-120 minutes
    c) more than 120 minutes

6. How often do you engage in dieting, eating special foods (for example, high protein or low fat foods) or taking nutritional supplements specifically to improve your appearance?

a) rarely or not at all
b) sometimes
c) frequently

7. How much of your income do you spend on items designed to improve your appearance (for example, on diet foods, nutritional supplements, hair products, cosmetics, cosmetic procedures, workout equipment or gym memberships)?

a) negligible
b) a more substantial amount, but never to the point of creating financial problems
c) enough to cause financial problems at some point

8. How much have your appearance-related activities undermined your social relationships? For example, have your workout activities, dietary practices or other appearance-related behaviors compromised your relationships with other people.

a) rarely or not at all
b) sometimes
c) frequently

9. How often has your sex life been compromised by your appearance concerns?

a) rarely or not at all
b) sometimes
c) frequently

10. How often have your appearance-related concerns or activities compromised your job, career or academic performance? For example, have you been late, missed work or school, worked below your potential or lost opportunities for advancement because of your appearance-related needs or self-consciousness?

a) rarely or not at all
b) sometimes
c) frequently

11. How often have you avoided being seen by other people because of your appearance concerns (for example not going to work, school or out in public)?

a) rarely or not at all
b) sometimes
c) frequently

12. Have you ever taken any type of drug –legal or illegal – to gain muscle, loose weight or otherwise improve your appearance?

a) never
b) only legal drugs or substances purchased over the counter or with a prescription
c) illegal use of steroids, diet pills or other substances

13. How often have your used more extreme measures (other than drug use) to change your appearance, such as excessive exercising, working out even when injured, fasting or other unhealthy dieting activities, vomiting, use of laxatives or other "purging" techniques or unconventional techniques for muscle development, hair growth, penile enlargement etc.)?

a) rarely or not at all
b) sometimes
c) frequently

APPENDIX F

Demographics

Age _____ Ethnicity _____

Major _____ Year in School _____

Mother's highest education completed: _____

Father's highest education completed: _____

Please indicate how much time (rounded to the nearest 15 minutes) you spend engaged in each type of exercise listed below. Also note how many sessions per week you perform each activity. Consider one instance to be any activity performed without more than a 10 minute break in activity. For example, if you lift weights for 90 minutes in the morning and 60 in the evening count that as two sessions, however if you lift weights for 120 minutes in the morning, count that as one session. If you are unclear, please ask the person administering this experiment.

	Minutes/Week	Times/Week
Aerobic exercise (running, jogging, stairmaster, etc.)	_____	_____
Anaerobic exercise (weight-lifting, strength training)	_____	_____
Calisthenics (sit-ups, push-ups, jumping jacks	_____	_____
Plyometics (training for explosive power)	_____	_____
Flexibility training (stretching, yoga, pilates)	_____	_____

Please describe below your motivations for exercising. What drives you to workout?

At what age did you begin to seriously workout? _____

Since beginning to exercise seriously, have there been any periods of time when you did not exercise vigorously for six months or more? (please check) ____ yes ____ no
Have you ever used performance enhancing supplements (protein powder, creatine, caffeine/ephedra based diet aids, androstenone or other supplements)? ____ yes ____ no

Have you ever used anabolic steroids? (please remember your response will not be shared with anyone, and your responses are strictly anonymous) ____ yes ____ no
Have you ever been diagnosed with an eating disorder, or told you may be at risk for one? ____ yes ____ no

Which magazines do you read on a regular basis? That is, which of the following do you read at least half of the issues that are published in the course of a year? Please check next to those magazines you read, then indicate to the right of the title approximately how much time you spend on an average issue of that publication.

Read	Time Spent	Read	Time Spent
____ AutoWeek	_____	_____ Baseball Digest	_____
____ Basketball Digest	_____	_____ Bicycling	_____
____ Bon Appetite	_____	_____ Car & Driver	_____
____ Computer Shopper	_____	_____ Consumer Reports	_____
____ Details	_____	_____ Discover	_____
_____ Entertainment Wkly	_____	____ ESPN Magazine	_____
_____ Field & Stream	_____	_____ Flex	_____
____ Food & Wine	_____	_____ GQ	_____
_____ GamePro	_____	_____ Gear	_____
_____ Golf	_____	_____ Golf Digest	_____
_____ Golf World	_____	_____ Gourmet	_____
_____ Guitar Player	_____	____ Ironman	_____
____ Jet	_____	____ Lucky Magazine	_____
_____ Maxim	_____	____ Men's Health	_____
_____ Men's Journal	_____	____ Ministries Today	_____
_____ Money	_____	____ Motor Trend	_____
_____ Mountain Bike	_____	____ Muscle & Fitness	_____
_____ MuscleMag	_____	____ National Geographic	_____
_____ Newsweek	_____	____ PC Magazine	_____
____ PC Gamer	_____	____ PC World	_____
_____ People	_____	____ Playboy	_____
_____ Popular Mechanics	_____	____ Popular Science	_____
_____ Reader's Digest	_____	____ Road & Track	_____
____ Rolling Stone	_____	____ Runner's World	_____

Read		Time Spent
____	Sporting News	_____
____	Stuff Magazine	_____
____	Town & Country	_____
____	US Weekly	_____
____	Yahoo Internet Life	_____

Read		Time Spent
____	Sports Illustrated	_____
____	Time	_____
____	US News & World Report	_____
____	Wired	_____

REFERENCES

American Psychological Association. (1994). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.) Washington DC: Author.

Anderson, A.E. (Ed.) (1990). *Males with eating disorders.* New York: Brunner Mazel.

Anderson, A.E. (1999). Eating disorders in gay males. *Psychiatric Annals, 29, 206-212.*

Anderson, R.E., Brownell, K.D., Morgan, G.D. & Bartlett, S.J. (1998). Weight loss, psychological and nutritional patterns in competitive female bodybuilders. *Eating Disorders, 6, 159-167.*

Baraff, A. (1991). *Men talk: How men really feel about women, sex, relationship and themselves.* New York: Penguin Books.

Bem, S.L. (1974). The measurement of psychological androgyny. *Journal of Counseling and Clinical Psychology, 42, 155-162.*

Beren, S.E., Hayden, H.A. Wilfley, D.E. & Grilo, C.M. (1996). The influence of sexual orientation on body dissatisfaction in adult men and women. *International Journal of Eating Disorders, 20, 135-141.*

Blumenthal, J.A., O'Toole, L.C. & Chang, J.L. (1984). Is running an analuge of anorexia nervosa? An empirical study of obligatory running and anorexia nervosa. *Journal of the American Medical Association, 252, 520-523.*

Boroughs, M. & Thompson, K. (2002). Exercise status and sexual orientation as moderators of body image disturbance and eating disorders in males. *International Journal of Eating Disorders, 31, 307-311.*

Brinded, P.M.J., Bushnell, J.A., McKenzie, J.M. & Wells, J.E. (1990). Body image distortion revisited: Temporal instability of body image distortion in anorexia nervosa. *International Journal of Eating Disorders, 9, 695-701.*

Bruch, H. (1962). Perceptual and conceptual disturbances in anorexia nervosa. *Psychosomatic Medicine, 24, 187-194.*

Cash, T.F. & Deagle, E.A. (1997). The nature and extent of body-image disturbances in anorexia nervosa and bulimia nervosa: A meta-analysis. *International Journal of Eating Disorder, 22, 107-125.*

Cohen, J. (1977). *Statistical power analysis for the behavioral sciences* (Rev. ed.). Hillsdale, NJ: Earlbaum.

Cooper, P.J., Taylor M.J., Cooper, Z. & Fairburn, C.G. (1987). The development and validation of the Body Shape Questionnaire. *International Journal of Eating Disorders, 6(4), 485-494.*

Davis, C., Fox, J., Cowles, M., Hastings, P. & Schwass, K. (1990). The functional role of exercise in the development of weight and diet concerns in women. *Journal of Psychosomatic Research, 34, 563-574.*

Davis, C. Shapiro, C, Elliot, S. & Dionne, M. (1993). Personality and other correlates of dietary restraint: An age by sex comparison. *Personality and Individual Differences, 14, 297-305.*

Drug Enforcement Agency. (2002). Drug Enforcement Agency drugs of concern (Anabolic Steroids). www.dea.gov/concern/steroids.html Retrieved on 6/01/2002.

Dunkley, T.L., Wertheim, E.H. & Paxton, S.J. (2001). Examination of a model of multiple socio-cultural influences on adolescent girls; body dissatisfaction and dietary restraint. *Adolescence, 36, 142*, 265-279.

DuRant, R.H., Rickert, V.I., Ashworth, C.S., & Newman, C. (1993). The use of multiple drugs among adolescents who use anabolic steroids. *New England Journal of Medicine, 328(13), 922-926.*

Edwards, S. & Launder, C. (2000). Investigation muscularity concens in male body image: Development of the Swansea Muscularity Attitudes Questionnaire. *International Journal of Eating Disorders, 28, 120-124.*

Epel, E.S., Spanakos, A., Kasl-Godley, J. & Browneil, K.D. (1996). Body shape ideals across gender, sexual orientation, socioeconomic status, race and age in personsal advertisements. *International Journal of Eating Disorders, 19, 265-273.*

Fallon, A.E. & Rozin, P. (1985). Sex differences in perceptions of desirable body shape. *Journal of Abnormal Psychology, 94, 102-105.*

Fichter, M.M. & Daser, C. (1987). Symptomatology, psychosexual development and gender identity in 42 anorexic males. *Psychological Medicine, 17, 409-418.*

French, S.A., Story, M., Remafedi, G. & Resnick, M.D. (1996). Sexual orientation and prevalence of body dissatisfaction and eating disordered behaviors: A population based study of adolescents. *International Journal of Eating Disorders, 19, 119-126.*

Fussell, S.W. (1991). *Muscle: Confessions of an unlikely bodybuilder*. New York: Poseidon Press.

Gardner, R.M. & Moncrief, C. (1988). Body image distortion in anorexics as a non-sensory phenomenon: A signal detection approach. *Journal of Clinical Psychology, 44, 101-107.*

Garner, D.M. (1997). The 1997 body image survey results. *Psychology Today, 30, 30-44, 75-84.*

Garner, D.M., Garfinkle, P.E., Schwartz, D. & Thompson, M. (1980). Cultural expectations of thinness in women. *Psychological Reports, 47*, 483-491.

Garner, D.M., Olmsted, M.P., Bohr, Y. & Garfinkel, P.E. (1982). The Eating Attitudes Test: Psychometric features and clinical correlates. *Psychological Medicine, 12, 871-878.*

Garner, D.M., Olmsted, M.P., Bohr, Y. & Garfinkel, P.E. (1982). The Eating Attitudes Test: Psychometric features and clinical correlates. *Psychological Medicine, 12, 871-878.*

Garner, D.M., Olmsted, M.P., Polivy, J.P. (1983). Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *International Journal of Eating Disorders, 2, 15-34.*

Gill, D.E. (1998). Gender and competitive motivation: from the recreation center to the Olympic arena. *Nebraska Symposium on Motivation, 45*, 173-207.

Goldfarb, L.A. & Plante, T.G. (1984) Fear of fat in runners: An examination of the connection between anorexia nervosa and distance running. *Psychological Reports, 55, 296.*

Groesz, L.M., Levine, M.P. & Murnen, S.K. (2002). The effect of experimental presentation of thin media images on body satisfaction: A meta-analytic review. *International Journal of Eating Disorders, 31, 1-16.*

Guthrie, S.R. & Castelnuovo, S. (1992). Elite women bodybuilders: Models of resistance or compliance? *Play and Culture, 5, 401-408.*

Halpin, C. & Fitzgerald, M. (1992). Screening for abnormal eating attitudes in male Dublin adolescents. *Irish Journal of Psychiatry, 13, 3-5.*

Hausenblas, H.A. & Fallon, E.A. (2002). Relationship among body image, exercise behavior and exercise dependence symptoms. *International Journal of Eating Disorders, 32, 179-185.*

Haworth-Hoeppner, S. (2000). The critical shapes of body image: The role of culture and family in the production of eating disorders. *Journal of Marriage and the Family, 62,* 212-227.

Heinberg, L.J. (1996). Theories of body image disturbance: Perceptual, developmental and socio-cultural factors. In J.K. Thompson (Ed.) *Body Image Eating Disorders, and Obesity: An Integrative Guide for Assessment and Treatment.* American Psychological Association: Washington, DC.

Hsu, L.K. & Sobkiewicz, T.A. (1991). Body image distrubance: Time to abandon the concept for eating disorders? *International Journal of Eating Disorders, 10, 15-30.*

Hulley, A.J. & Hill, A.J. (2001). Eating disorders and health in elite women distance runners. *International Journal of Eating Disorders, 30, 312-317.*

Imm, P.S. & Pruitt, J. (1991). Body shape satisfaction in female exercisers and non-exercisers. *Women and Health, 17, 87-96.*

Jacobi, L. & Cash, T.F. (1994). In pursuit of the perfect appearance: Discrepancies among self-ideal percepts of multiple physical attributes. *Journal of Applied Social Psychology, 34, 414-424.*

Kiernan, M., Rodin, J., Brownell, K.D., Wilmore, J.H. & Crandall, C. (1992). Relation of level of exercise, age and weight-cycling to weight and eating concerns in male and female runners. *Health Psychology, 11(6), 418-421.*

Klein, A.M. (1993). *Little big men: Bodybuilding subculture and gender construction.* Albany, NY: State University of New York Press.

Klein, A.M. (1990). Little big man: Hustling, gender narcissism and bodybuilding subculture. In M.A. Messner & D.F. Sabo (Eds.) *Sport, Men and the Gender Order: Critical Feminist Perspectives.* Champaaign, IL: Human Kinetics Books.

Kouri, E. Pope, H.G., Katz, D.L. & Oliva, P. (1995). Fat-free mass index in users and non-users of anabolic-androgenic steroids. *Clinical Journal of Sport Medicine, 5, 223-228.*

Lakkis, J., Ricciardelli, L.A., & Williams, R.J. (1999). Role of sexual orientation and gender-related traits in disordered . *Sex Roles, 41, 1-16.*

Lavin, M.A., Cash, T.F. (2001). Effects of exposure to information about appearance stereotyping and discrimination on women's body images. *International Journal of Eating Disorders, 29, 51-58.*

Lautenbacher, S. Roscher, S., Strain, F. Pirke, K.M & Krieg, J.C. (1993). Theoretical and empirical considerations on the relation between body image, body scheme and somatosensation. *Journal of Psychosomatic Research, 37, 447-454.*

Leiberman, S. (1995). Anorexia nervosa: The tyranny of appearances. *Journal of Family Therapy, 17*, 133-138.

Leit, R.A., Pope, H.G., Jr. Gray, J.J. (2001). Cultural expectations of muscularity in men: The evolution of Playgirl centerfolds. *International Journal of Eating Disorders, 29, 90-93.*

LeUnes, A. & Burger, J. (2000). Profile of Mood States in sports exercise psychology: Past, present and future. *Journal of Applied Sport Psychology, 12, 5-15.*

Levine, M.P., Smolak, L. & Hayden, H. (1994). The relation of socio-cultural factor to eating attitudes and behaviors among middle school girls. *Journal of Early Adolescence, 14*, 471-490.

Mazur, A. (1986). U.S. trends in feminine beauty and over-adaptation. *Journal of Sex Research, 22* 281-303.

McNair, D.M., Lorr, M. & Droppleman, L.F. (1971). Manual for the Profile of Mood States. San Diego: Educational and Industrial Testing Service.

Meyer, C., Blissett, J. & Oldfield, C. (2001). Sexual orientation and eating psychopathology: The role of masculinity and femininity. *International Journal of Eating Disorders, 29, 314-318.*

Murnen, S.K. & Smolak, L. (1997). Femininity, masculinity and disordered eating: A meta-analytic review. *International Journal of Eating Disorders, 22, 231-242.*

National Eating Disorders Association (2004). ED Info Index. http://www.nationaleatingdisorders.org/p.asp?WebPage_ID=294. Retrieved on 5/15/2004.

National Eating Disorders Association (2004). *Health consequences of eating disorders.* [Brochure]. Seattle, WA: Author.

National Institute on Drug Abuse (2004). Info-facts: Steroids. http://www.drugabuse.gov/Infofax/steroids.html. Retrieved on 5/15/2004.

Nichter, M. & Nichter, M. (1991). Hype and Weight. *Medical Anthropology, 13,* 249-284.

Norcorss, J.C., Guadagnoli, E. & Prochaska, J.O. (1984). Factor structure of the Profile of Mood States (POMS): Two partial replications. *Journal of Clinical Psychology, 40(5), 1270-1277.*

Norton, I.K., Olds, T.S., Olive, S. & Dank, S. (1996). Ken and Barbie at life size. *Sex Roles, 34, 3,* 287-294.

Nudelman, S., Rosen, S.E. & Leitenberg, H. (1988). Dissimilarities in eating attitudes, body image distortion, depression and self-esteem in women with bulimia nervosa. *International Journal of Eating Disorders, 7, 625-634.*

Olivardia, R., Pope, H.G., Jr. & Hudson, J.I. (2000). Muscle dysmorphia in male weightlifters: a case-control stud. *American Journal of Psychiatry, 157, 1291-1296.*

Olivardia, R., Pope, H.G., Manweth, B. & Hudson, J.I. (1995). Eating disorders in college men. *American Journal of Psychiatry, 152, 1279-1285.*

Pederson, E.L. & Markee, N.L. (1991). Fashion dolls: Representations of ideal beauty. *Perceptual and Motor Skills, 73,* 93-94.

Phillips, K.A. (1997). *The broken mirror.* New York: Oxford University Press.

Pinhas, L., Toner, B.B., Ali, A., Garfinkel, P.E. & Stuckless, N. (1999). The effects of the ideal of female beauty on mood and body satisfaction. *International Journal of Eating Disorders, 25, 223-226.*

Pope, H.G. Jr., Gruber, AJ., Choi, P.Y., Olivardia, R. & Phillips, K.A. (1997). Muscle dysmorphia: An under-recognized form of body dysmorphic disorder. *Psychosomatics, 38, 548-557.*

Pope, H.G., Jr., Katz, D.L. (1994). Psychiatric and medical effects of anabolic-androgenic steroid use: a controlled study of 160 athletes. *Archives of General Psychiatry, 51, 375-382.*

Pope, H.G. Jr., Olivardia, R., Gruber, A. & Borowiecki, J. (1999). Evolving ideals of male body image as seen through action toys. *International Journal of Eating Disorders, 26, 65-72.*

Pope, H.G. Jr., Phillips, K.A. & Olivardia, R. (2000). *The Adonis Complex: The secret crisis of male body obsession.* New York: Free Press.

Powers, P.S., Schocken, D.D. & Boyd, F.R. (1998). Comparison of habitual runners and anorexia nervosa patients. *International Journal of Eating Disorders, 23, 133-143.*

Rand, C.M., Kuldau, J.M. (1990). The epidemiology of obesity and self-defined weight problem in the general population: Gender, race, age, and social class. *International Journal of Eating Disorders, 9, 329-343.*

Rand, C.M. & Wright, B.A. (2001). Thinner females and heavier males: Who says? A comparison of female to male ideal body sizes across a wide age span. *International Journal of Eating Disorders, 29, 45-50.*

Rodin, J., Silberstein, L.R., & Striegel-Moore, R.H. (1985). Women and weight: A normative discontent. In T.B. Sonderegger (Ed.), *Nebraska symposium on motivation, Vol. 32: Psychology and Gender* (pp. 267-307). Lincoln: University of Nebraska.

Russell, C.J. & Keel, P.K. (2002). Homosexuality as a specific risk factor for eating disorders in men. *International Journal of Eating Disorders, 31, 300-306.*

Schneider, J.A., O'Leary, A. & Jenkins, S.R. (1995). Gender, sexual orientation and disordered eating. *Psychology and Health, 10, 113-128.*

Siever, M.D. (1994). Sexual orientation and gender as factors in socioculturally acquired vulnerability to body dissatisfaction and eating disorders. *Journal of Consulting and Clinical Psychology, 62, 252-260.*

Silberstien, L.R., Mishkind, M.E., Stiegel-Moore, R.H. & Timko, C. (1989). Men and their bodies: A comparison of homosexual and heterosexual men. *Psychosomatic Medicine, 51, 337-346.*

Slay, H.A., Hayaki, J., Napolitano, M.A. & Brownell, K.D. (1998). Motivations for running and eating attitudes in obligatory versus non-obligatory runners. *International Journal of Eating Disorders, 23, 267-275.*

Spence, J.T., Helmreich, R.L. (1978). *Masculinity and, femininity: Their psychological dimensions, correlates and antecedents.* Austin: University of Texas Press.

Spitzer, B.L., Henderson, K.A. & Zivian, M.T. (1999). Gender differences in population versus media body sizes: A comparison over four decades. *Sex Roles, 40, 545-565.*

Stice, E. & Shaw, H.E. (1994). Adverse effects of the media portrayed thin-ideal on women and linkages to bulimic sympotatology. *Journal of Social and Clinical Psychology, 13, 288-308.*

Stormer, S.M. & Thompson, J.K. (1995, November). The effect of media images and socio-cultural beauty ideals on college-age women: A proposed psychoeducational program. Paper presented at the meeting of the association for the advancement of behavior therapy, New York.

Stormer, S.M. & Thompson, J.K. (1998, November). Challenging media messages regarding appearance: A psychoeducational program for males and females. Paper presented at the meeting of the association for the advancement of behavior therapy, Washington, DC.

Striegel-Moore, R. & Kearney-Cooke, A. (1994). Exploring parents' attitudes and behaviors about their children's physical appearance. *International Journal of Eating Disorders, 15,* 377-385.

Strong, S.M., Williamson, D.A., Netemeyer, R.G. & Geer, J.H. (2000). Eating disorder symptoms and concerns about body defer as a function of gender and sexual orientation. *Journal of Social and Clinical Psychology, 19, 240-255.*

Sutton-Smith, B. (1986). *Toys as culture.* New York: Guilford Press.

Syzmanski, L.A. & Semie, R.J. (1997). A re-examination of body-image distortion: evidence against a sensory explanation. *International Journal of Eating Disorders, 21, 175-180.*

Tantleff-Dunn, S. & Thompson, J.K. (1995). Romantic partners and body image disturbance: Further evidence for the role of perceived-actual disparities. *Sex Roles, 33, 589-605.*

Taylor, C.B. et al. (1998). Factors associated with weight concerns in adolescent girls. *International Journal of Eating Disorders, 24*, 31-42.

Weight, L.M. & Noakes, T.D. (1987). Is running an analog of anorexia? A survey of the incidence of eating disorders in female distance runners. *Medicine and Science in Sports and Exercise, 19, 213-217.*

Williamson, I. & Hartley, P. (1998). British research into the increased vulnerability of young gay men to eating disturbance and body dissatisfaction. *European Eating Disorders Review, 7, 1-4.*

Wiseman, C., Gray, J., Mossiman, J., Ahrens, A. (1992). Cultural expectations of thinness in women: An update. *International Journal of Eating Disorders, 11*, 85-89.

Yager, J., Kurtzman, F. Lansverk, J. & Wiesmeier, E. (1988). Behaviors and attitudes related to eating in homosexual male college students. *American Journal of Psychiatry, 145, 495-497.*

Yates, A., Shisslak, C.M., Allender, J., Crago, M. & Leehey, K. (1992). Comparing obligatory and nonobligatory runners. *Psychosomatics, 33, 180-189.*